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COMMERCIAL ALOES.*

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The widespread use and general popularity, as well as the commercial importance, of aloes are indicated by the fact that this drug is official in every known national Pharmacopœia.[1] There is, however, quite a difference of opinion as to the therapeutically most desirable or most active variety of aloes. There also appears to be considerable confusion or misunderstanding as to the origin or sources of the existing commercial varieties of the drug.

With a view of collecting some reliable data as to the differences in quality or source of origin of the aloes sold under the varying trade names at the present time, a systematic study of a number of available samples was undertaken.

For these samples, as well as for a number of valuable suggestions, I am indebted to wholesale druggists, drug brokers, importers and manufacturers in different parts of the country, and also to Messrs. Gehe & Co., Dresden-Neu-Stadt, Germany; Mr. Elias W. Cheney, U. S. Consul, Curaçao, Dutch W. I.; and Mr. S. A. Macallister, U. S. Consul, Barbadoes, W. I. The uniformly courteous replies to letters of inquiry, or to requests for samples, indicate a spirit of willingness to foster and aid any inquiry that has for its object the collection and dissemination of legitimate information.

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HISTORY.

The history of the early use of aloes is decidedly meagre. According to the editors of the Pharmacographia,[2] the earliest reliable references to this drug are to be found in The Natural History of Pliny, and in the Materia Medica of Dioscorides. There can be no doubt, however, that aloes had been in use for a very long time before the days of either Pliny or Dioscorides.

This opinion would appear to be corroborated by Dragendorff,[3] who states that aloes is included among the drugs mentioned in the papyrus discovered by Ebers in Egypt.

The plant was cultivated and the drug produced in southern Europe, along the shores of the Mediterranean, at an early date. Treumann,[4] in his monograph on aloes, mentions a number of references that would appear to bear out this statement, and also indicate that as late as the sixteenth century a very good quality of aloes was being produced, at least in Spain.

The aloes mentioned in the Bible is of entirely different origin, and was used for a different purpose. In the East this ahaloth, or aloe wood, is used even at the present time as an ingredient in the sweet-smelling incense used in connection with religious celebrations.[4]

The more interesting portion of the history of aloes is that connected with the development of the various trade varieties of the drug.

This more recent history is given in considerable detail in the Pharmacographia,[2] Flückiger's Pharmacognosie,[5] Pereira's Materia Medica,[6] and also in an interesting article by Prof. J. Uri Lloyd, published in the *Western Druggist*.[7]

We shall have occasion to refer to some of these authorities again later, when we come to consider aloes under the different trade names.

It may be interesting here to review these different trade names as they appear in works of reference at different periods during the nineteenth century.

The American Dispensatory,[8] at the beginning of last century, gives a description of four available varieties of aloes. These were:

"(1) Cape Aloes.—Cheap; imported into England in large quantities, chiefly for use of porter-brewers.

"(2) Socotrine Aloes.—From the Island of Socotra, usually wrapt in skins.

"(3) Barbadoes or Hepatic Aloes.—From the West Indies.

"(4) Fetid, Caballine or Horse Aloes.—An inferior and grossly adulterated variety of the drug."

This same classification, or rather these same trade names, have come down to us with but slight changes. The first three are used extensively even at the present time and, as we shall see later, more often as a matter of convenience, or as a designation for a certain physical quality than as an indication of the geographical source or origin of the drug.

Pereira, in his Materia Medica,[6] states that he had met with eight varieties of aloes in trade at that time.

Of Socotrine aloes he says: "This was formerly brought by way of Smyrna and is still called 'Turkey aloes.' It is now imported almost exclusively from Bombay." Pereira also notes that this kind of aloes varied considerably in consistence and color, and that it usually came in skins, which he supposed were skins of gazelles.

Genuine Hepatic Aloes.—This Pereira describes as liver-colored Socotrine aloes. This also came to the London markets by way of Bombay, and was often called Bombay or East-Indian aloes.

Barbadoes Aloes.—Aloes in gourds weighing from 60 to 70 pounds. It was usually of a dull opaque liver-color, and was not infrequently called hepatic aloes.

Cape aloes, Pereira says, "comes in chests or skins; it has a shining resinous appearance."

Fetid, horse or caballine aloes was thought by Pereira to be an impure or cheap grade of aloes, without any specific origin.

Mocha aloes was said to be another species of cheap aloes often adulterated with sand, strings, etc.

Indian Aloes.—Of this Pereira says there were several kinds. That from Northern India was black and brittle, somewhat resembling Barbadoes aloes.

Guzerat aloes resembled the above, but was not so brittle.

Salem aloes was dark, but more gummy.

Trichinopoli aloes resembled Cape aloes in brittleness, odor and color, but was more opaque.

Curaçao Aloes.—Pereira says: "While not commercial in London, is used to some extent in Holland. It is said to resemble Cape aloes more than that from Barbadoes." The United States Dispensatory[9] of about the same period describes but four varieties of the drug. These were Cape, Socotrine, Hepatic and Barbadoes aloes.

Dr. Squibb,[10] in a report on the state of the drug market during the early years of the Civil War, says: "The better grades of aloes have been scarce, while the inferior grades of aloes, such as Cape, Curaçao, Bonaire and Barbadoes, have been quite abundant." This appears to be one of the early references to Bonaire aloes as a distinct variety.

Professor Maisch,[11] in his Materia Medica, mentions Socotrine, Barbadoes, Cape, Mocha, Caballine and Natal aloes. The latter is described as "light yellowish gray-brown, dull and opaque, crystalline under the microscope."

The United States Dispensatory of about the same date mentions Natal aloes as a variety of Cape aloes.[12]

At the present time the different national Pharmacopœias recognize but three separate kinds of aloes:[1]

Socotrine, official in the United States,[14] British,[15] Roumanian and Portuguese Pharmacopœias.

Cape, a glossy, transparent variety, is official in all the European Pharmacopœias.

Barbadoes, official in the United States,[14] British[15] and several of the European Pharmacopœias.

In addition to these official varieties, we find the following names mentioned either in the price-lists of wholesale druggists or in contemporary pharmaceutic literature: Curaçao, Bonaire, Uganda and Jaffarabad. These different trade names will be referred to more in detail in a later portion of this paper.

BOTANICAL ORIGIN AND SOURCES.

Engler and Prantl, in their exhaustive work on the useful plants, say: "There are more than eighty-five species of Aloe, of which upward of sixty are found in Cape Colony and are indigenous to it. There is but one variety on the island of Socotra (Aloe Perryi, Baker), and this is usually mentioned as the source of the so-called Socotrine aloes."

The most northern species of aloes (Aloe Vera, Lin., Aloe Barbadensis, Miller) is probably indigenous to the northern shore of Africa, and from there has gradually spread to the southern shores of Europe, to Syria, Arabia, the East Indies, and later to the islands of the West Indies, principally Barbadoes.

Aloe Chinensis, Baker, is regarded by Engler and Prantl as belong-

ing to this species, slightly modified by cultivation, soil or other environments. If this opinion is correct, and the difference between Aloe Vera and Aloe Chinensis[17] is merely an acquired one, due to soil or climate, it would readily explain the supposed occurrence of a modified Aloe Chinensis in the West Indian Islands.

Aloe Vera, Lin., may be properly regarded, then, as the source of the so-called Barbadoes and Curaçao aloes.

Aloe Ferox, Miller, has been definitely determined by Tschirch[18] to be the source of Cape aloes as well as of the new crown or Uganda aloes.

The source of Natal aloes has never been positively determined. Holmes[19] has suggested that this variety of aloes was largely if not entirely obtained from Aloe Socotrina, Lam.

Jaffarabad aloes has been variously said to be obtained from Aloe Abyssinica, Lam., Aloe rubescens, D. C., and Aloe Indica, Royle. In this connection it would appear desirable that a concerted attempt be made to definitely identify the various plants furnishing what is now usually sold as Socotrine Aloes.

SOCOTRINE ALOES.

The Island of Socotra is usually considered to be the original source of the drug aloes. Alexander the Great, 333 B. C., is said to have sent a commission to the Island of Socotra[20] to investigate the production of aloes.

Engler and Prantl[16] give an interesting account of the gathering of Socotrine aloes. This product, it appears, is called by the natives of the Island "Jâyef," and by the Arabs, "Scobr."

The process of gathering is very simple. A depression is made in the ground and this is lined with a goat- or a sheep-skin. The aloe leaves being cut off near their base are laid around this depression, so that the exuding juice flows into and is retained by the skin. From Socotra this watery juice is occasionally exported to Muscat and Arabia. The greater portion of the gathered juice, however, is allowed to evaporate spontaneously. After a month, when it has become quite thick and viscid, it has become decidedly more valuable and is called Jâyef Gesheeshah. After continued evaporation for several weeks more, when it has become quite hard, it is called Jâyef Kasahul, and corresponds to the most desirable quality of so-called Socotrine aloes. It is known as Aloe lucida, has a decidedly

glossy appearance, and varies from a grayish-yellow to red in color. In thin layers it is transparent and gives a light yellow powder.

Very little or none of this true Socotrine aloes comes into the Western markets. This latter opinion is corroborated by every writer that has ever investigated the probable source of Socotrine aloes. Lloyd[7] gives several references that bear out this statement. Squibb[21] says that the aloes which reaches this market from the shipping ports Bombay, Muscat, Aden and Zanzibar are all classed as Socotrine aloes, irrespective of their botanic or geographic origin or source. Dohme,[22] in referring to this same statement, says that the soft, dark and malodorous variety occasionally sold as Socotrine aloes is known as Mocha aloes in the East, and comes from the interior of Southern Arabia.

Dr. E. R. Squibb,[21] in speaking of the method of preparing Socotrine aloes, says: "An incidental disadvantage of the Eastern method of inspissating aloe juice is the fact that the aloes always contains a much larger percentage of foreign matter, such as sand, shreds of aloe plants, splinters of various kinds and sizes, nails, bits of leather, and even the rude implements used for cutting the leaves."

A method of purifying Socotrine aloes was introduced into the United States Pharmacopœia in 1860, and has been retained through three revisions. According to Dr. Squibb, who was instrumental in introducing "purified aloes," the loss in purifying and powdering Socotrine aloes varies from 7 to 22 per cent.

CAPE ALOES.

Aloes has been produced in Cape Colony since 1773 and has been an important article of commerce ever since. Cape aloes is recognized in nearly all of the European Pharmacopœias; it was dropped from the Pharmacopœia of the United States in 1880, but is still used in this country to a very considerable extent, being preferred by many medical practitioners, particularly those of German or European training, on account of its more reliable, but milder action.[20] Genuine Cape aloes, as usually seen, has a glossy, translucent appearance; black in reflected light, reddish to yellowish-brown in transmitted light. It is brittle when dry, and can be easily powdered, giving a yellowish-green or yellowish-brown powder, the latter usually having a decidedly greenish tinge.

According to the German Pharmacopœia,[24] "aloes should be

vitreous, have a conchoidal fracture, dark brown color, peculiar odor and bitter taste. It should give transparent splinters that do not show crystals under the microscope."

In addition to these physical properties the same Pharmacopœia also gives a number of tests for identity and purity, some of which will be referred to in connection with the discussion on the chemical constituents of aloes.

While it is true that the German Pharmacopœia does not specifically call for Cape aloes, or aloes from Cape Colony, Schneider and Süss,[25] in their commentary, say that Cape aloes is the only available variety that corresponds in all respects to the requirements of this Pharmacopœia.

This restriction to Cape aloes has been extensively commented upon, but usually favorably. Of the arguments that have been advanced in favor of this variety of aloes, we may mention that in Germany this grade of aloes is usually considered the most reliable as well as the most active.[20] Then, too, the argument has been advanced by drug brokers[26] that Cape aloes is always available and usually in sufficient quantities of uniform quality. In the past forty years it is said Cape aloes has been scarce but once, while other varieties have been repeatedly scarce and sometimes disappeared entirely.

Despite the fact that Cape aloes has been an article of commerce for upwards of 125 years, the botanical source of the drug, as well as the exact method of gathering and preparing, has been the subject of much controversy.

Professor Tschirch, in a recent number of the *Schweizerische Wochenschrift*,[18] states that Cape aloes is obtained exclusively from Aloe Ferox, Miller.

The gathering of the juice, it appears from the same article, is still carried on in the old primitive method, very much the same as that followed on the Island of Socotra; a depression in the ground is lined with a goat- or sheep-skin and the butt ends of the aloe leaves are placed so that the exuding juice will flow into the receptacle so formed. After draining for several hours, the heaps of leaves are scattered and the wilted, partially dried ends cut off; then the leaves are again placed to drain into the receptacle formed by the skin-lined depression; when this is filled, or when, after repeated clippings, the leaves are quite exhausted, the exuded juice

is baled out and subsequently carried to the place where it is evaporated.

The evaporation is usually done over an open fire and is both difficult and disagreeable, the escaping steam is saturated with irritating fumes that attack the operator, particularly his eyes and the mucous membranes of his nose, mouth and throat. Considerable care is necessary to avoid burning on the one hand, and to evaporate the juice sufficiently on the other so as to have it set hard and solid when poured into the case or box.

New methods are, however, being introduced, and much of the fresh juice is now being sold by the gatherers to manufacturers who evaporate the juice by improved methods. Among these, the use of steam heat is said to insure a more uniform product. Another innovation that is being introduced in South Africa is the spontaneous evaporation of the partially fermented and clarified juice; this method furnishes an aloes that is characteristic in many respects and is being marketed as a distinct variety.

BARBADOES ALOES.

Barbadoes aloes was first brought to the London market about 1693. It does not, however, appear to have become a regular article of commerce until nearly half a century later. The *American Gazetteer*[27] (1804) enumerates aloes as one of the minor productions of the island of Barbadoes. Sir R. H. Shomburgk,[28] quoted by Pereira,[6] gives extensive statistics of the exports of aloes from the Island of Barbadoes. These statistics cover a period of more than 100 years; the figures given vary from an average of 327 gourds in 1745 to upwards of 4,227 gourds in 1843.

This probably represents the maximum development of the aloe industry in Barbadoes, as the figures for 1844 and 1845 show a considerable diminution.

A writer in a recent number of the *Chemist and Druggist*,[29] in speaking of Barbadoes aloes, says: "The aloe industry has gradually diminished from 1852 to the present time, when a cultivated patch of not more than half an acre in extent is all that is left of this once flourishing industry."

The method of gathering the juice in Barbadoes differed materially from that followed in Africa. It is given in detail in an article by Mr. W. G. Freeman, quoted by the *Chemist and Druggist*.

Mr. Freeman says: "The aloe flowers in the early part of the year, and when the flowers have died and the stalks have withered, reaping may commence. The leaves of a plant are cut off right through the plant about 6 inches above the base, and the dripping ends placed in wooden V-shaped troughs, from which the juice flows to the collecting vessel placed under an aperture in the trough. The exuded juice is then taken to the boiling-house, where the concentrating takes place in copper pans heated by direct heat. As the boiling point is reached, stirring is necessary to prevent charring; on continued boiling the liquid thickens and becomes darker in color. The operator determines the proper consistency of the residual mass by the appearance of the bubbles that appear on the surface of the thick juice. When these bubbles are large and glossy, and a film of the removed liquid dries almost at once, the proper degree of concentration has been reached, and the thick viscid aloes while still hot is poured into gourds holding from 20 to 60 or 70 pounds."

Despite the fact that no appreciable quantity of aloes has been exported from Barbadoes for ten or twelve years, the name itself, like the corresponding name of Socotrine aloes, has been firmly established and is generally used to designate a variety of aloes more or less closely corresponding to what had formerly been sold as Barbadoes aloes.

There has been considerable diversity of opinion in regard to the actual disappearance of true Barbadoes aloes from the American market. Several American drug firms have inquired closely into the availability of Barbadoes aloes, and all reported that no true Barbadoes aloes was available at the present time. The *Chemist and Druggist*, September 6, 1902, in its report of the drug market, includes seven small tins of Barbadoes aloes that sold at auction for 29*s*. per cwt. This report appeared at variance with the generally accepted ideas, and also with the report of Mr. W. G. Freeman,[30] quoted above.

To get some definite information on the subject, a personal letter was addressed to the present U. S. Consul, Mr. S. A. Macallister, of Barbadoes, asking for information in connection with the present status of the aloe industry on the island.

Consul Macallister, under date of October 31, 1902, writes: "Aloes have not been cultivated in Barbadoes for some years past, nor has any been exported to my knowledge." He further states

that aloes are cultivated and exported from the island of St. Vincent. This St. Vincent aloes would probably go direct to the London market, and is no doubt the true origin of the Barbadoes aloes noted by the *Chemist and Druggist.* The bulk of what is generally sold as Barbadoes aloes is bought and sold at first hand as Curaçao or Bonaire aloes.

CURAÇAO ALOES.

Curaçao, and the practically identical variety sometimes called Bonaire aloes, comes from the Dutch West India Islands, and, at the present time at least, is largely if not exclusively produced on the island of Aruba. The aloes from Curaçao does not appear to have been found on the European markets before the beginning of the nineteenth century. Pereira mentions it as a distinct variety, and says that while he had not seen specimens of it, and none had been offered on the London markets, it had been repeatedly seen in Holland.

A description of Curaçao aloes was published by Mr. A. Faber,[31] who states that it is most like Cape aloes, but does not possess the greenish color which is sometimes perceived in the latter. From the fact that even in Holland it could not be regularly obtained, it was supposed that its production at that time was scanty. From Faber's description it would appear that the South African method of highly heating the juice and boiling until quite viscid was at first employed exclusively.

Curaçao aloes appears to have varied considerably in physical appearance from time to time, no two of the older descriptions of this variety of aloes agreeing in all particulars.

The source and production of aloes in the Dutch West India Islands has also changed to some extent.

According to an account published in the AMERICAN JOURNAL OF PHARMACY[32] (1896), the production in the three islands for the years 1885, 1886 and 1887 was as follows in kilos:

	1885.	1886.	1887.
Curaçao	2·080	·500	
Bonaire	5·821	18·640	2·075
Aruba	123·115	158·011	189·925

According to a report of the British Consul in Curaçao (quoted by Gehe & Co., Dresden), the production for 1898, 1899 and 1900 was as follows in kilos:

	1898.	1899.	1900.
Bonaire	4·758	22·474	27·779
Aruba	257·518	231·365	373·375

with practically none produced on the island of Curaçao itself.

These figures are also verified by a communication received from U. S. Consul Elias W. Cheney, at Curaçao, in answer to an inquiry regarding the source and production of aloes in the Dutch West India Islands.

This letter of inquiry was prompted by the fact that at the present time several kinds of aloes are met with in the drug trade, all purporting to be Curaçao aloes. Of these we may mention:

(1) Aloes in gourds; this is of the so-called livery variety, opaque, brittle, crystalline under the microscope and is almost invariably sold as Barbadoes aloes.

(2) Aloes in cases, livery variety, and also corresponding in other physical properties to that mentioned above.

(3) Glossy Curaçao aloes, also known as Capey Curaçao aloes. This also comes in cases, and is evidently being prepared to fill a demand for glossy, transparent aloes, particularly from European countries. Gehe & Co. report that this variety of Curaçao aloes has a large sale in European countries, outside of Germany. Capey aloes is frequently mentioned in the reports of the London drug markets and usually commands a higher price than does the ordinary or livery variety. U. S. Consul E. W. Cheney, with the communication referred to above, kindly forwarded a statement by Mr. S. C. Heneigney on the aloe industry of the Dutch West Indies. According to Mr. Heneigney, the difference in appearance is due largely to the amount of heat applied near the conclusion of the evaporation process.

"For the livery variety, the juice is not evaporated to dryness, but is poured into gourds or boxes while still soft; here on further evaporation it sets and becomes hard; this product is always opaque. When the final evaporation is done over the fire the resulting aloes is glossy and more or less transparent."

This same feature, the possible change in the physical properties of aloes, due to the amount of heat applied, was noted by Mr. E. Robiquet in a paper quoted in the AMERICAN JOURNAL OF PHARMACY for 1856.[33] In answer to a question on the methods of preparing or evaporating the exuded juice, Mr. Heneigney says: "All juices are

evaporated on open fire. At Aruba there is a steam machine for its evaporation, but this does not work through vacuum process."

"In these islands the juice is never evaporated spontaneously." This latter statement is also borne out by the fact that Curaçao aloes never contains any appreciable amount of foreign materials, and usually contains a comparatively high percentage of water-soluble ingredients. The method of gathering the juice is usually described as being similar to that employed formerly on the island of Barbadoes; according to some descriptions the V-shaped troughs appear to be arranged about a central receptacle for gathering and containing the exuding juice.

UGANDA OR CROWN ALOES.

In the spring of 1900 there appeared on the London market what appeared to be a new variety of aloes. Some one had given it the name Uganda, and as such it was soon widely known and generally referred to. This new variety of aloes had many of the physical properties of a good quality of hepatic aloes. It differed, however, from the ordinary hepatic or West Indian aloes, in that it did not give the well-known red color reaction with nitric acid.

It was afterwards learned that this supposed new variety was true Cape aloes, but prepared in an entirely different way. Professor Tschirch, in his paper on the origin of Cape aloes,[18] mentions this new variety and gives an outline of its preparation. It appears that instead of evaporating the exuded juice of the aloe plant over an open fire, as is done for Cape aloes, it is allowed to undergo partial fermentation, and then the clear juice is decanted from the formed precipitate. This clear juice is then allowed to evaporate spontaneously by exposure to the sun.

Professor Tschirch, in this same paper, also states that the name Uganda is a misnomer and has no origin in fact; where, when or by whom it was originated appears to be a mystery, particularly as the manufacturers, by stamping a crown on the packages, appear to have intended that this particular quality of aloes be known as crown aloes.

Dr. George Weigel, in a paper published in the *Pharmaceutische Centralhalle*,[34] gives a review of the literature that has accumulated on this variety of Cape aloes. He states that it is being produced in the neighborhood of Mossel Bay, Cape Colony, and differs from

Cape aloes in appearance more than chemical contents. Weigel also gives a comparative table of solubility, ash and water content of Uganda aloes, compared with some of the other well-known varieties.

	Per Cent. Water-Soluble.	Per Cent. Ash.	Per Cent. Water.
Uganda aloes	43·48	0·72	8·74
Cape aloes	66·80	0·90	9·30
Curaçao glossy	72·44	2·40	7·74
Curaçao hepatic	71·26	1·60	9·32

This table brings to mind a statement made by Holmes and Fuge at the British Pharmaceutical Conference, Edinburgh, 1892:[35] "The sooner the exuded juice is evaporated after collection, the larger is the proportion of water-soluble matter."

Uganda aloes does not appear to have met with the popular and rapid success that its promoters had anticipated. This is probably largely due to the fact that in every European Pharmacopœia in which Cape aloes is official, the requirements are that it be glossy and vitreous. This is particularly true of the German Pharmacopœia, in which considerable stress is laid on this particular physical property.

According to Gehe & Co., it is probable that the process will be so modified as to produce a variety of aloes that will conform more nearly with the requirements of the German Pharmacopœia.

This particular variety of aloes does not appear to have reached the American market, as a number of inquiries sent to wholesale dealers and drug brokers failed to furnish any clue to even a specimen sample of the new drug. In older works of reference[6-12] a modified or better quality of Cape aloes is sometimes referred to under the name "Bethelsdorp" aloes. This is not now an article of commerce, but may have been the antecedent of Uganda aloes.

JAFFARABAD ALOES.

This variety of aloes, while not found on the American market, has been referred to by several European writers recently, and is particularly interesting in connection with some of the newer work on the chemistry of aloes.

According to Schneider and Süss[25] this is a vitreous variety from the East Indies. It appears to reach the European markets from Bombay. Holmes,[36] in describing this variety of aloes, says:

"Externally it is of black color, and having a lustre not unlike that of pitch, to which at first sight it bears some resemblance. The fracture is black and glossy and very slightly porous. The powder is of a pale brown hue."

NATAL ALOES.

This variety of aloes, while not at the present time an article of commerce, has figured so extensively in the pharmaceutic literature of comparative recent times that some references to its almost phenomenal rise and fall in popular favor would not appear out of place.

According to the Pharmacographia,[2] the first aloes was exported from Natal in 1869. From this date the amount rapidly increased for several years. The statistics, quoted by the same authority, are as follows:

1868.	1869.	1870.	1871.	1872.
None	38 cwt.	646 cwt.	371 cwt.	501 cwt.

Therapeutic reports on this variety of aloes were not favorable, however, and its popularity waned so rapidly that in 1890 not a single person in the neighborhood of Greytown was making or gathering aloes, and none was being exported.[37]

At the present time no samples of this variety of aloes are available outside of museum specimens. Gehe & Co., in answer to a letter of inquiry, report that this variety of aloes, ten to fifteen years ago, had quite an extensive sale, being the kind usually supplied to their trade when "hepatic aloes" was called for. They have not been able to supply this particular kind of "hepatic aloes" for upward of ten years.

(To be continued.)

A METHOD FOR THE PREPARATION OF MEDICINAL MANGANESE DIOXID.

By August Gotthelf, Ph.D.

The object of the following work, carried out at the instance of Professor Coblentz, was to devise a method for the preparation of a pure manganese oxid of approximately constant composition adapted for medicinal use. With exception of the method adopted, all other methods which have been proposed are open to the objection of being either beyond the means of the average pharmacist, or they yield precipitates which are exceedingly difficult to purify,

particularly so when larger quantities are prepared. The process described is that proposed by Professor Jannasch (Prakt. Leitfaden f. d. Gewichts-analyse, 1897) as a quantitative method for the estimation of manganese; the composition of the precipitate, according to this authority, is that of a hydrated manganese dioxid ($MnO_2.2H_2O$). Carnot, who first suggested the method (subsequently worked out by Jannasch), claimed that the precipitate formed had the composition of Mn_6O_{11} (Bull. de la Soc. Chim. de Paris (3), 1275, 1889). Freidheim (Zeitschs. f. anal. Ch. 38, 681, 1899) demonstrated the views of the latter to be incorrect, stating that if the precipitation be carried out in the presence of a large excess of ammonium salts, the composition of the precipitate more nearly approaches that of MnO_2.

According to my experiments, the precipitate obtained is never a pure hydrated manganese dioxid, but always contains some of the lower oxids, the percentage of which in the final product depends largely on the temperature of drying.

The method adopted consists in precipitating the oxid from a solution of manganese sulphate, through the addition of a mixture of ammonia and hydrogen peroxid.

For this purpose 250 c.c. each of aqua ammonia (10 per cent.) and hydrogen dioxid (3 per cent.) diluted to the volume of 1,000 c.c. are added, with constant stirring, to a solution of 50 grammes of crystallized manganous sulphate ($MnSO_4.4H_2O$) in 1,000 c.c. of water. After washing several times by decantation, the precipitate is then transferred to a filter and the washing continued until free from sulphate, and dried at 150° C.

If the manganese is poured into the alkaline solution, the proportion of dioxid produced falls below 43 per cent., with a corresponding increase in the quantity of manganoso-manganic oxid. The dioxid in the dry product was determined by means of standard oxalic acid and permanganate in the usual manner, while the total manganese was found by converting into the sulphate through heating with a slight excess of sulphuric acid, repeating the operation until all of the oxid has been converted into a white manganous sulphate of constant weight.

It is impossible to remove all of the water of hydration of the precipitated oxid; for even at 210° C., a temperature at which the precipitate begins to lose oxygen, some water is still retained. It

was found that a temperature of 150° C. was sufficient to remove a greater percentage of the water without danger of converting into the manganoso-manganic oxid. The precipitate approximates the following composition: $4MnO.$ 20 to 25 MnO_2.

Temp. of Drying.	Total Manganese Per Ct.	Manganese as MnO_2. Per Ct.	Total Mn as MnO_2. Per Ct.	Water. Per Ct.	0.5 Gm. = $MnSO_4$ Gm.	Approximate Composition.
100° C.	60.60	35.78	59.05	11.37	0.8321	$4MnO.6MnO_2$
125° C.	61.35	48.80	79.56	6.62	0.8424	$4MnO.16MnO_2$
150° C.	62.41	54.61	87.51	3.56	0.8570	$4MnO.25MnO_2$
150° C.	62.77	52.06	82.94	3.84	0.8620	$4MnO.20MnO_2$

In view of the suggestion of Freidheim that the composition of the precipitate more nearly approximates MnO_2 with the increase in the percentage of ammonium salts added, various trials were made in which 10 grammes (No. I), 25 grammes (No. II), and 50 grammes (No. III) of ammonium sulphate were employed, using the same proportions of usual reagents, with negative results as far as the composition of the precipitate is concerned. Freidheim employed much larger quantities of the ammonium salt than we did, which may explain differences.

Number.	Dried at	Total Mn. Per Cent.	Mn as MnO_2.	Total Mn as MnO_2.	Water.
I	150° C.	62.74	50.85	81.06	4.22
II	150° C.	63.22	49.63	78.51	3.95
III	150° C.	62.60	51.26	81.90	4.30

Inasmuch as we are able to obtain a product of fairly constant composition, with some manganous oxid present, which is to its advantage, we considered further experiments in this direction unnecessary.

The approximate yield in oxid from 50 grammes of manganese sulphate is 20 grammes.

ESSENTIAL OILS OF FIREWEED AND ERIGERON.

By Lyman F. Kebler and Dr. George R. Pancoast.

Genuine oil of fireweed, *Erechthitis hieracifolia*, is comparatively a commercial rarity. The chief sources of supply are small distillers, composed principally of farmers, whose botanical knowledge is not very extensive. The plants are gathered by these men and their help, the latter frequently caring little as to the kind of "weeds" collected, and when it is remembered that the common name "fireweed" is applied to no less than six different wild plants, it is not

surprising that very little genuine oil finds its way into the channels of trade. This condition, however, does not appear to worry some oil dealers, for they boldly fill any order for fireweed oil with erigeron oil and label it fireweed oil. Such fraudulent transactions cannot be criticised too severely. Let everything be labelled what it is. In the course of many years the writers have met with but two consignments that complied approximately with the recognized normal constants of oil of fireweed: one, a limited supply at a high price, from a large grower and distiller, and the other from a small distiller. In 1887 A. M. Todd[1] made a careful study of the oil known to be genuine, and a few years later F. B. Power[2] went over the oil again. Their results were as follows:

Source.	Specific Gravity.	Opt. Rot.
Todd	0·845 — 0·855	— 4′ to + 4°
Power	0·838 at 18·5° C.	— 2° to + 2°

The two oils mentioned above, as of fairly good quality, tested as follows: No. 1, specific gravity 0·8422, opt. rot. + 1° 32′, soluble in equal volume of alcohol, no more; No. 2, specific gravity 0·8244, opt. rot. + 2° 12′, insoluble in alcohol.

The following constants are typical of the products frequently supplied for oil of fireweed: Specific gravity 0·859, opt. rot. + 66° 48′, soluble in an equal volume of alcohol. The above data indicate erigeron oil, which has been found to possess the following constants: Specific gravity 0·850 to 0·870, opt. rot. + 52°, soluble in an equal volume of alcohol.

We desire to note in this connection that either the commercial erigeron oils are themselves adulterated or they vary materially in properties (we incline toward the latter view, as the oil readily resinifies), as the following results show:

	Specific Gravity.	Opt. Rot.
1	0·8904	+ 28° 48′
2	0·8629	+ 84° 28′
3	0·8963	+ 48°
4	0·8604	+ 83° 42′
5	0·8551	+ 72°
6	0·8549	+ 72°

All of the samples examined by us for boiling-point varied from 172° to 178° C., uncorrected, with a slight residue.

[1] Am. Jour. Pharm., 59, 309.

[2] *Pharm. Rundschau*, 5, 201.

SOME FURTHER NOTES ON ESSENTIAL OILS.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

In discussing essential oils from the point of view of the pharmacist, we should not forget that by far the greater portion of the oils imported into, or distilled in, this country is used by confectioners, perfumers or manufacturers of toilet and laundry soaps, and that but a comparatively insignificant proportion of the total product is used as medicine, or in the making of medicinal preparations.

While this fact should and does have considerable bearing on the relation that these products bear to their use in pharmacy and their recognition in the Pharmacopœia, it must also be recognized as the factor that has played a most important part in the scientific as well as commercial development of the essential oils; for, without the tremendous consumption that is made possible by the requirement of the industries enumerated above, there would be little or no incentive for the scientific investigations that have been made to determine the physical properties and chemical composition of these different products.

It will readily be conceded that the United States Pharmacopœia should not be expected, or for that matter not be allowed, to be a standard of authority as to what the confectioner, perfumer or soap maker should or should not use in his particular productions. This is the more evident when we remember that while in some cases the pharmacopœial standard may fall far short of what would be required by a manufacturer, in other cases the same requirements would be impracticable on account of the excessive cost of the comparatively high-grade materials.

From the medical or pharmaceutical point of view, the determining factors for recognition in the Pharmacopœia, or for the standard of excellence of the substances recognized, should be largely determined by therapeutic efficiency, uniformity in composition and the stability of recognized substances under ordinary conditions. These requirements suggest two distinct points that we wish to call attention to in connection with the following notes on essential oils.

The first thought suggested is that the United States Pharmacopœia should not include descriptions and tests for an essential oil that is not used as medicine, or as an addition to a medicinal preparation included in the Pharmacopœia.

The second thought is that wherever practicable the Pharmacopœia should direct that the active constituent of essential oils be used in place of the whole product.

Bearing these two points in mind, let us first take a survey of the following table giving the quantity and average price per pound of the more popular oils of the orange group. The accompanying figures have been copied from the annual reports of the United States Treasury Department, of the imports for consumption, for the fiscal years ending June 30th.

TABLE No. 1.

QUANTITIES IN POUNDS AND AVERAGE PRICE PER UNIT OF QUANTITY OF THE ESSENTIAL OILS OF THE CITRUS GROUP IMPORTED INTO THE UNITED STATES DURING THE FIVE FISCAL YEARS NOTED AT HEAD OF COLUMNS.

Oil of	1902.	1901.	1900.	1899.	1898.
Bergamot	99'886	75'640	71'937	66'112	31'019
Per pound	1.67	1.90	1.53	1.77	1.59
Lemon	391'485'5	268'341	261'978	237'302	160'264
Per pound	.721	.861	.808	.783	.73
Lime	4'203	5 904	3 156	3'092	721
Per pound	.781	1.01	.946	1.03	.67
Neroli	7'762	4'319	2'250'2	1'911	1'535
Per pound	8.37	9.71	11.91	11.86	12.06
Orange	79'160'5	72'218	57'069	52'378	33'732
Per pound	1.32	1.52	1.67	1.30	1.34

These figures illustrate very well the tremendous increase in the use of the essential oils of this particular class. The average price is another interesting feature of this table. All of the oils, with the single exception of oil of orange flowers, have practically maintained their price during the whole period. The gradual decline in the price of the oil of orange flowers is largely due to the introduction of synthetic products that have been used as substitutes for the natural oil. This feature will be referred to again later under the head of oil of orange flowers.

Oil of Bergamot.—This is one of the oils that could well be dropped from our Pharmacopœia on account of not having any well-defined therapeutic uses. The physical or chemical properties are not thoroughly understood, but it is generally conceded that the oil obtained from fruit, at different stages of ripening, has quite a differ-

ent chemical composition and consequently differs in physical properties. It has been observed, for instance, that with the ripening of the fruit the ester content of the oil increases while the amount of linalool decreases. The amount of terpene also increases, while the relation of the limonene to dipentene remains about the same.

Charabot (quoted by Kremers and Brandel, *Pharm. Rev.*, 1902, p. 305) concludes that linalool is first formed and converted by the free acetic acid to ester on the one hand and terpene on the other. According to Schimmel & Co., the specific gravity of oil of bergamot should be from 0·883 to 0·886. The requirements of the various national Pharmacopœias vary, according to the Universal Pharmacopœia, from a minimum of 0·860 in the Austrian to a maximum of 0·890 in the National Pharmacopœia of Switzerland, the limit in our own United States Pharmacopœia being from 0·880 to 0·885.

Gildemeister and Hoffmann describe oil of bergamot as being a brownish yellow or honey-colored liquid that is often colored green by the presence of copper. It might be stated here that Parry, on the other hand, appears to think that the green color is due to dissolved chlorophyll.

Oil of bergamot is said to be frequently adulterated with oil of sweet orange or oil of lemon. Either of these oils would have a tendency to reduce the specific gravity and at the same time increase the angle of optical rotation. The optical rotation of oil of bergamot is stated by Schimmel & Co. to be from plus 9 to plus 15.

An interesting possibility in this connection is the marketing by Schimmel & Co. of an 80 per cent. linalyl acetate. Oil of bergamot seldom contains more than 40 per cent. of linalyl acetate.

While the price of the stronger product is at the present time almost prohibitive, the manufacturers think that for certain purposes it would be of advantage on account of the absence of color and the much smaller quantity that would be required.

Oil of Lemon.—The specific gravity of oil of lemon, according to Schimmel & Co., is from 0·858 to 0·861; in this the upper limit of the U.S.P. is rather lower, being 0·859.

The optical rotation is given as from plus 59 to plus 67. Burgess and Child (quoted by Schimmel & Co.) say that up to the present time the following constituents have been found in oil of lemon: pinene, phellandrene, limonene, citral, octyl and nonyl aldehydes, geranyl acetate, geraniol, methyl ester of anthranilic acid, citronellol,

citroptene and a resin. The principal odoriferous agent is probably citral, while octyl and nonyl aldehydes, though present in only small quantities, play a very important part in the aroma.

For a satisfactory examination of lemon oil the same authors consider the following data important:

(1) Specific gravity at 15° C., from 0·856 to 0·860.

(2) Optical rotation power in a 100 mm. tube fluctuates from plus 58 to plus 63.

(3) Index of refraction at 20° C. by means of Abbe's refractometer; this fluctuates from 1·4733 to 1·4830; normal about 1·4755.

(4) The determination of the citral content, or the total content of aldehydes in 25 c.c. of the oil: Citral content from 4 to 7 per cent.

(5) Submit the oil to fractional distillation.

The principal adulterants of oil of lemon are lemon oil terpenes, turpentine, lemon grass citral, and occasionally distilled lemon oil.

Oil of Limes.—This oil, according to the reports of the Treasury Department, is becoming quite an important commercial article. There are two distinct varieties of oil of lime; the one from the West India Islands, consisting largely of limonene and citral, has a specific gravity of from 0·880 to 0·885. This oil is obtained from the fruit of citrus medica, var. acida Brandes.

Italian oil of limes, according to Hoffmann and Gildemeister, is obtained from the fruit of citrus limetta, Risso, and is an oil of brownish-yellow color, having an odor somewhat resembling oil of bergamot. The composition of this oil also resembles oil of bergamot, in that it contains linalyl acetate (about 25 per cent.), linalool and limonene. Italian oil of limes has a specific gravity of about 0·872.

Oil of Orange Flowers.—According to Gildemeister and Hoffmann, the specific gravity of this oil should be between 0·870 and 0·880. The natural oil contains linalyl acetate, linalool, limonene, methyl ester of anthranilic acid, geraniol and paraffin. In order to obtain an oil of neroli that is at all normal, it is necessary to distil the flowers for the oil alone, and not, as is often the practice, collect the oil as a by-product in the manufacture of orange-flower water.

According to recent reports of Schimmel & Co., the quality of the natural oil is of much less importance now than formerly. They also

claim to have perfected their artificial oil to such an extent that the natural oil can be completely dispensed with. The product is said to replace not alone the oil, but also the perfume of orange flowers made by maceration or extraction.

In addition to artificial oil of neroli, a substance that has been given the name nerolin is used extensively as a substitute for the natural oil. Nerolin is met with in commerce as a white crystalline powder. It is particularly applicable to the perfuming of soap, not being attacked by hot lye. On account of its comparatively low price it is used extensively in the manufacture of cheaper grades of toilet soap. It is readily soluble in alcohol and essential oils, and is said to be a very powerful and lasting perfume. The effect that these synthetic and artificial products have had on the price of the natural oil has already been mentioned. In addition to the marked reduction in price the quality of the natural oil is said to have been improved by greater care in its production.

Oil of Orange.—The specific gravity of this oil, according to Gildemeister and Hoffmann, varies from 0·848 to 0·852. The specific gravity as given in the different national Pharmacopœias differs from 0·830, the minimum in the Russian, to 0·870, the maximum of the Dutch Pharmacopœia. The optical rotation of this oil varies from plus 96 to plus 98. Oil of orange peel is said to vary much less in its physical constants than either oil of bergamot or oil of lemon. The chief constituents of the oil are limonene and citral. In this connection it may be interesting to note that practically all of the oils of the citrus group are imported, little or no oil of a satisfactory quality being made in this country.

Oil of Anise.—As is well known, commercial oil of anise is derived from two distinct and widely different plants. The true oil of anise seed is obtained from the fruit of Pimpinella Anisum, L., an annual umbelliferous plant, while what is usually sold as oil of anise, in this country particularly, is obtained from the fruit of Illicium Verum, Hook., an evergreen shrub belonging to the natural order Magnoliaceæ, and indigenous to China.

The physical properties of these two oils are very much the same, though they differ materially in their chemical composition. True oil of anise, according to Schimmel & Co., consists of anethol, anise ketone and methyl chavicol, while the oil of star anise, in addition to anethol and methyl chavicol, also contains pinene, phellandrene,

safrol and the ethyl ether of hydroquinone. While the odor and other physical properties depend largely, if not entirely, on the contained anethol, it will be readily appreciated that on closer examination the two oils would present marked differences. To overcome any possible misunderstanding between the two oils, the German and the Swedish Pharmacopœias direct that under oil of anise only the oxygenated portion of the oil, the anethol, be dispensed or used in medicinal preparations. Anethol, according to Schimmel & Co., should congeal at from 21° to 22° C.; the melting point according to the same authority is somewhat higher, being from 22·5° to 22·7° C.

The German as well as the Swedish Pharmacopœia gives the congealing point of anethol as from 20° to 21° C., the specific gravity from 0·984 to 0·986, and the boiling point from 232° to 234° C.

In view of the fact that anethol is commercially available, at a price little above that of good oil of anise seed, it would appear as though the Pharmacopœial Revision Committee would be justified in restricting the title of oil of anise to the oxygenated portion, or anethol.

Oil of Caraway.—This is another of the essential oils that differ in composition and physical properties. Kremers, in commenting on oil of caraway (*Phar. Rev.*, 1902, p. 467), asks: "What should be recognized as oil of caraway by the U.S.P., the crude oil, the rectified oil, the twice rectified oil or carvone?" All of them are said to be articles of commerce, and all of them differ in their chemical constituents and physical properties.

Here again the German and Swedish Pharmacopœias have taken what would appear to be the most rational course and, as in the case of oil of anise, direct that the oxygenated portion alone be recognized as oil of caraway. The Swedish Pharmacopœia gives the specific gravity of carvone as being from 0·963 to 0·966 at 15° C., and the boiling point from 229° to 230° C.

In contrast to these figures, having a rather limited range, it may be mentioned that the limits of specific gravity, according to the official Pharmacopœias, varies from 0·883, the minimum of the Portuguese, to 0·960, the maximum of the Russian Pharmacopœia. The boiling point, according to the Portuguese Pharmacopœia, may vary from 190° to 245° C.

Schimmel & Co. give the specific gravity of a normal oil of caraway as varying from 0·905 to 0·915. According to Gildemeister and Hoffmann, the oil consists of from 50 to 60 per cent. of carvone and from 40 to 50 per cent. of limonene.

According to a manufacturer's agent the double and triple rectified oils of caraway should be looked on with suspicion, as it is more than likely that a portion of the carvone has been abstracted in the process.

The difference in price between carvone and oil of caraway will probably be materially reduced in the near future, as the manufacturers are beginning to find a use or demand for the portion of the oil containing limonene. This is being sold as carvene and is used quite extensively by manufacturers of toilet and laundry soaps as a scent.

Oil of Coriander.—Probably the most interesting feature in connection with this oil is the marked difference in the price of the commercial product. Oil of coriander can be bought at almost any price from $5 to $15 a pound, and, according to the statement of a dealer in essential oils, with the margin of profit rather in favor of transactions at the lower price. The oil that is furnished at the lower figure is said to be blended or plugged with oil of fennel, with or without oil of orange, and is guaranteed to conform to the requirements of the U.S.P.

According to Gildemeister and Hoffmann, oil of coriander is composed of coriandrol, which is a dextrorotary modification of linalool, pinene and at least one other not as yet isolated body to which the peculiar odor of oil of coriander is due.

Oil of Fennel.—The chemical constituents of this oil differ with the source or origin of the seed. German, Austrian, Bulgarian and Japanese oil of fennel are said (Gildemeister and Hoffmann) to contain anethol and fenchone; the French oil of fennel, obtained from sweet or Roman fennel, contains no fenchone, while the oil distilled from wild fennel contains little or no anethol.

In this country the chief use of oil of fennel appears to be as an addition to other more expensive oils of the same class, with a view of improving, blending, compounding or plugging the same. Oil of fennel itself is often cheapened by robbing it of a considerable proportion of its contained anethol, which is present in the German oil of fennel to the extent of from 50 to 60 per cent. In addition to

fenchone and anethol, the different oils of fennel contain variable quantities of pinene, phellandrene, dipentene and limonene. All of these constituents, however, vary with the source or origin of the seed.

In conclusion, and as an additional argument in favor of the adoption of the active constituents of essential oils as representing the most desirable portion from a medical point of view, we may call attention to the fact that the last edition of the Swedish Pharmacopœia has gone farther even than the German, which preceded it by about two years, and has adopted anethol, carvone, eucalyptol, eugenol and cinnamic aldehyde as representing the active constituents and the medicinally active portions of the respective oils from which they are derived.

RECENT LITERATURE RELATING TO PHARMACY.

RADIOACTIVE MATTER.

Radioactive matter constitutes one of the most interesting problems in physics or chemistry at the present time.

The rapid accumulation of literature on the subject, the variety and interesting nature of the experiments that have been recorded, and the numerous, and at times diverging opinions held by individual experimenters make this a subject that the ordinary individual can hardly expect to keep fully in touch with.

A review of the present status of the problem by one that has been himself engaged in original investigations in this line is therefore of more than passing interest.

W. Marckwald, of the Chemical Institute of the University of Berlin, has just published quite an exhaustive review of this subject in the *Berichte der Deutschen Pharmaceutischen Gesellschaft* (Berlin, 1903, page 11). From this paper much of the following data has been taken; a few additional quotations have been added, when thought of sufficient interest.

In 1896 Henri Becquerel discovered that salts of uranium had the peculiar property of emitting a form of energy that readily penetrated opaque substances, such as paper or aluminium foil, and produced effects on photographic plates similar to those produced by the X-rays. In addition to the property of affecting a photographic plate through opaque substances, these rays of energy resemble X-rays in

that they ionize gases and make them conductors of electricity. They also induce phosphorescence in phosphorescent bodies. These emanations have been called Becquerel rays, from their discoverer, Monsieur Henri Becquerel.

These Becquerel rays appear to be of a composite nature, no less than three distinct rays or forms of energy being recognized at the present time as emanating from the so-called radioactive materials.

A-rays are said to be readily absorbed by opaque, or even transparent bodies; they are not deflected in a magnetic field, and act as ionizing agents.

B-rays readily penetrate opaque substances; they are not as active as ionizing agents, however, and in addition to this are readily deflected by a magnet. In this latter quality they appear to resemble the cathode rays.

In addition to these two distinct forms of energy, radium also emits luminous rays; the exact nature of this light has not been definitely determined, but it is probably due to a fluorescence or phosphorescence of the material itself, caused by the inherent energy.

The Becquerel rays are also classed according to their source or origin; thus they are usually spoken of as uranium rays, radium rays, or thorium rays, according as they are generated from one or the other.

Uranium Rays.—As noted above, uranium was the first of the known elements that was found to possess radioactive properties. Becquerel found that the metal as well as all of the salts of uranium were more or less radioactive. So far as known there is no marked difference in the activity of the uranium salts coming from different sources. This latter fact would appear to indicate that the radiations were inherent in the uranium atom. This has been questioned, however, and it has been shown by Crookes, and later by Rutherford and Soddy, that by repeatedly washing a uranium salt with ether the A-rays are retained by the insoluble, while the B-rays are found in the ether-soluble portions. If in addition to this we remember that several substances have been isolated that are many thousand times as radioactive as uranium, it will be seen that the admixture of even a very minute portion of some new and hitherto unrecognized elementary body may be the cause of this radioactive property.

Radioactive Bismuth.—The observation that some of the minerals containing uranium were more highly radioactive than any of the

salts of this element, induced Madame and Monsieur Curie to try and separate out from pitchblende that portion to which the added radioactivity was due.

After considerable experimenting they were able to separate out a body that had the physical properties of bismuth, but was at least 100 times more radioactive than uranium. From the fact that ordinary bismuth salts did not show any radioactive properties the Curies came to the conclusion that in this case the radioactivity was due to some new elementary body to which they gave the name polonium, from Poland, the native country of Madame Curie.

According to W. Marckwald, who has devoted a considerable amount of time to the investigation and study of this substance, the radioactive portion of the bismuth salt is closely related to tellurium; he therefore calls it *radioactive tellurium.* Marckwald also states that the rays emitted by radioactive tellurium, or polonium as it is still called in France, are composed largely if not entirely of A-rays. They ionize gases, affect photographic plates, and are readily absorbed by all substances, even paper. Many phosphorescent bodies are lit up brightly when brought near or in contact with this substance. One peculiar property, noted by Marckwald, is that when a genuine diamond is brought near or in contact with a small quantity of polonium it lights up brightly, the visible light being sufficient to cause change in photographic plates. O. Rosenheim (*Chem. News*, 1902, page 247) substantiates this assertion, but says that the so-called black diamonds are an exception to this rule. He also says that the phosphorescent rays emitted by the diamond will affect photographic plates and are distinguishable from the rays emitted by polonium itself in that they penetrate paper and glass. The phosphorescence ceases as soon as the polonium is removed.

Radium.—Soon after the discovery of polonium the Curies found another substance in pitchblende that was strongly radioactive; this substance they called radium. Radium has been generally accepted as a new addition to the list of elements; it appears to have properties somewhat resembling barium, from which it is with difficulty separated. Madame Curie (*Compt. Rend.*, 1902, page 161) has been able to separate out a small quantity of pure radium chloride, by fractional crystallization. E. Demarcay has determined the purity of this sample by means of the spectroscope and found that it did not contain the spectrum of any other known element.

From this very small quantity of pure radium, the atomic weight was determined by weighing the amount of chlorine present in a given amount of radium chloride, as silver chloride. From a number of experiments the average was found to indicate an atomic weight of 225. Barium chloride under similar conditions indicates an atomic weight between 137 and 138.

An interesting observation was made in this connection; it was found that the precipitated silver chloride invariably had radioactive properties without containing any appreciable quantities of radium. This will be referred to again, however, under induced radioactivity.

The radioactivity of radium is much superior to that of polonium; in addition to the A-rays it also has a marked activity in B-rays, and, as noted before, also exhibits luminous or visible rays.

A radium-barium chloride containing not more than 1 per cent. of radium will readily affect a photographic plate in one minute, and will cause fluorescence in a barium-platinum cyanide screen at a distance of several decimeters.

Radium is said to have a most remarkable effect on the human eye. If a vial containing radium is brought near the closed eye of a person, it will cause the sensation of great light. This peculiar effect has been attributed by Giesel to phosphorescence in the vitreous body. Inflammatory conditions or burns, similar to those caused by the X-rays, have also been caused by prolonged exposure to the Becquerel rays. A somewhat similar action on the green leaves of growing plants has also been noted. By prolonged exposure the chlorophyll is destroyed and the leaf turned yellow without killing it.

Beside these physiologic actions these rays also have chemical properties. Air is ozonized; glass is colored purple or dark brown; salts of alkalies are colored; pure sodium sulphate, for instance, is given a green tint; but when contaminated with even a trace of chloride it becomes violet instead.

Anhydrous radium chloride and bromide are strongly phosphorescent and emit sufficient light to make them visible in a dark room. This phosphorescence is inherent in the substance and not caused by extraneous light or energy as in the case of calcium sulphide. The crystalline salts of radium are not as strongly phosphorescent, but are more active in emitting Becquerel rays.

Thorium Rays.—Salts of thorium have radioactive properties

similar to those exhibited by uranium. Thorium rays were first observed by C. G. Schmidt in 1898. An interesting observation in this connection has recently been made by Rutherford and Soddy. They found that when thorium hydrate was precipitated from a solution of a thorium salt by means of ammonia, the resulting thorium hydrate possessed little or no radioactivity, while the solution contained a substance that has as yet not been identified, which was radioactive. The most interesting and surprising observation, however, was that after several days the precipitated thorium hydrate had regained its radioactivity, while the substance soluble in the ammonia solution lost correspondingly. The same experiment could be repeated a number of times with the same substance.

Actinium.—This is a name given to a substance that was separated by Debierne from pitchblende. Actinium has some properties in common with thorium, but is said to be 5,000 times as radioactive. It has been questioned whether the radioactivity of this substance is inherent, or simply induced by other more active materials.

Induced Radioactivity.—Both radium as well as thorium, as has been pointed out, have the property of inducing radioactivity in substances with which they come in contact. Radium is the more active in this respect, imparting activity to all materials with which it comes in contact. The intensity of the radioactivity, induced in other substances, depends on the intimacy of the contact; if, for instance, a salt is precipitated out of a solution containing a radioactive chemical, the precipitated salt will be strongly radioactive for the time being, but will gradually lose this property. As in the case of the precipitated thorium hydrate the radioactive chemical loses a larger part of its radioactivity for the time being, but will regain it again on standing.

Among other substances that appear to have radioactive properties it might be added that Hoffman and Strauss have separated a radioactive lead from a number of uranium-bearing minerals. Baskerville has separated radioactive carolinium from thorium; both of these substances are supposed to be self-radioactive, and not dependent on induction or contamination by other more radioactive materials.

What the future may have in store is difficult indeed to say; but even from the material to hand at the present time, it would appear that physicists and chemists have before them a problem that will

necessitate a very great amount of thought and study for its solution, but when solved it will represent a most important step into the realms of the unknown. One interesting feature in this connection is the fact that practically all of the elements that are known to possess radioactive properties are of high atomic weight, representing practically the border line of the unknown in the periodic system. This, of course, suggests a possibility of discovering another series of elements of higher atomic weight and still greater radioactivity.

M. I. WILBERT.

ALCOHOL FROM FECAL MATTERS.

At a meeting of "*Isis*," a German society for study of natural science, a lecture was delivered by Dr. von Meyer on January 22, 1903, on the production of alcohol by dry distillation of feces. The methods are covered by patents, and the results are, it is said, unexpectedly favorable from a commercial point of view. The lecturer reported the results of an experiment that he had carefully carried out in the laboratory of the inventor of the method. The yield was 80 grammes of alcohol (presumably absolute, but this is not stated) from 1,000 grammes of solid feces. The degree of dryness of the mass is not given, but it does not appear that it was thoroughly dried; 225 liters of combustible gas and some extremely foul-smelling tar were produced. Some experimenters have obtained much smaller yields; but a commission of three chemists, appointed by the German patent office, obtained a yield of 70 grammes of alcohol from 1,000 grammes of solid feces. On this basis, 100 kilos of the material would yield 9 liters of alcohol, a better result than can be obtained by the fermentation of potatoes. Experiments on the large scale have not yet been made, nor are the causes of the somewhat discordant results of the laboratory experiments known, but the practicability of the method is probable. The lecturer suggested that the nature of the method would render the product unsuitable for internal use, and, therefore, enable it to be sold under less excise restrictions; but this is doubtful. When carefully purified, the product might be indistinguishable from alcohol from fermentation.

The successful introduction of the method on a large scale might have a most beneficial influence on public hygiene, since anything which will materially increase the commercial value of fecal matter will be a strong inducement to the substitution of other methods of disposal than the water-carriage systems.

Assuming a yield of 7 per cent. of alcohol, it is estimated that a community of 100,000 persons would furnish, annually, 4,500 hectoliters of alcohol (over 100,000 gallons). The gaseous by-products also have value. It is stated that they can be utilized in connection with the incandescent mantle, and as fuel for the distillation process itself. The tar may have value, while the coke-like residue will have some fertilizing properties. Nothing is said in the report (as given in *Oesterr. Chem. Zeit.*, March 1, 1903) about the nitrogenous products, but these will surely have important uses.

HENRY LEFFMANN.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

TECHNIQUE DES ANALYSES CHIMIQUES, MEDICALES, INDUSTRIELLES, DE PRODUITS ALIMENTAIRES ET PHARMACEUTIQUES, A L'USAGE DES PHARMACIENS, par J. Tarboureich A. Maloine. Paris, 1903. Price, 6 francs.

In a compact little volume of 509 pages, bound in flexible cloth, we have an attempt to prepare what may be called a *vade mecum* for the pharmacist who wishes to be able to analyze a variety of products, such as would likely be offered for examination or be handled by him.

In the first chapter the commoner forms of laboratory apparatus and utensils are described and their use explained, together with an account of important chemical reagents, indicators, volumetric solutions, etc.

In the second chapter we have in detail the reactions of the mineral acids and bases, the organic acids and alkaloids, and a number of tables for the systematic testing for acids, bases and alkaloids.

In the four remaining chapters we have the four classes of compounds mentioned in the title taken up and concise methods of analysis given for them. Thus we have the analyses of fertilizers (to which, by the way, twenty-six pages are given) quite fully described, clays, potashes and lyes, alcohols, a few alloys, soaps, sugars, tannins, cements and petroleums; under foods and drinks, wine, beer, cider, vinegar, oils, flour, milk and potable waters; under medical products we have a very full section on urinanalysis (twenty-nine pages), urinary calculi and gastric juice; and lastly, under pharmaceutical products, we have, in the compass of 114 pages, the methods of analysis or assay of a large number of inorganic and organic drugs, with the tests of the French Pharmacopœia.

The book is a convenient and handy book for a trained pharmacist or pharmaceutical chemist, but is too condensed to be of much help to a beginner. It will not obviate the necessity of thorough laboratory drill and education, but would be undoubtedly of value to the educated pharmacist. We do not recall any book in the English language that covers quite so broad a field in so small compass with equal satisfaction. S. P. S.

PHARMACEUTICAL MEETING.

The regular monthly pharmaceutical meeting of the Philadelphia College of Pharmacy was held Tuesday, April 21st, Mr. Thomas S. Wiegand, Librarian of the College, acting as chairman.

The first paper on the programme was on "The Pharmacy of Liquid Petrolatum," by E. Fullerton Cook, P.D., Assistant Director of the Pharmaceutical Laboratory, and will be printed in a later issue of this JOURNAL. The paper was accompanied by a large number of specimens.

In discussing the paper, Mr. Wiegand agreed with the author that chloroform used as a solvent for alkaloids intended for use in nasal sprays would be extremely irritating. He asked the author if he had tried making the emulsion of petrolatum, by shaking finely powdered acacia with the liquid petrolatum, as is done in the preparation of turpentine emulsion, and said that he supposed it might be made satisfactorily. Mr. Boring also commented upon this method of making emulsions and said that it originated with J. Winchell Forbes, of California (see this JOURNAL, 1872, p. 61).

In reference to the formula for cold cream proposed by Dr. Alpers (see this JOURNAL, 1901, p. 117), in which liquid petrolatum was used instead of almond oil, Mr. Wilbert said that in his experience, the preparation was both stable and efficient, and that he knew a number of pharmacists who had followed the formula with satisfaction. Mr. Cook said that he had not found it as efficient for sunburn due to exposure at the seashore. In regard to the therapeutics of petrolatum, Dr. Lowe read a short quotation from Dr. Hare's work on therapeutics. Others taking part in the discussion were Messrs. Weidemann and Kraemer.

The next paper was on "Some Further Notes on Essential Oils," by M. I. Wilbert, Ph.M. (see page 218). In discussing this paper Mr. Wiegand said that *a priori* one would consider that the expressed

or hand-pressed oils of the citrus group would be better than the distilled oils unless they were distilled under special conditions. He also recalled the fact that in 1850 oil of neroli sold for from $3.50 to $5.00 per ounce.

Mr. Wilbert said that the distilled oils were manufactured under improved conditions, which prevented the breaking up of the valuable constituents, and seemed to make the oil of greater value practically. He then read extracts from a letter from Fritzsche Bros., New York City, relative to the replacement of the natural by the synthetic oil of neroli.

Mr. Boring referred to an interesting illustrated paper in a recent number of *World's Work*, on the lemon and orange industries of California. Mr. Wilbert said that the soluble lemon and orange oils on the market are usually lemon grass citral, which is terpeneless, and therefore more soluble, and in this connection read a further extract of a letter from Fritzsche Brothers:

"There is only a comparatively small amount of lemon and orange oils produced in California, and the samples which have, so far, come to our notice were of very inferior quality. It is, therefore, not to be expected that these California oils will prove to be in serious competition with the Italian oils. The terpeneless oils of lemon and orange are now largely employed in the manufacture of soluble extracts, and since they are now perfect in flavor, they can advantageously be employed by manufacturers."

Remarks were also made on the olive oil industry of California; by Messrs. Boring and Bamford. The latter stated that he had learned recently that a company had been organized to express the fixed oil from raisin seeds, which was to be used as a substitute for olive oil.

In connection with Mr. Wilbert's paper the following specimens, furnished by Fritzsche Brothers, were exhibited: Anethol (oil of anise, extra strong), oil of caraway seed (light, carvene), linalool, oil of fennel seed (sweet), oil of fennel seed (sweet, chaff), oil of anise seed (Russian, rectified), oil of lemon (hand-pressed), oil of caraway seed (Dutch, twice rectified), oil of orange (sweet, hand-pressed), oil of limes (distilled), carvol (oil of caraway, extra strong, specific gravity 0.960), oil of neroli (synthetic oil of orange flowers), nerolini (pure, crystallized). Specimens of neroline and linalool, furnished by Fries Brothers, were also shown.

A vote of thanks was tendered the authors of the papers.

PHILADELPHIA COLLEGE OF PHARMACY.

THE EIGHTY-SECOND ANNUAL COMMENCEMENT.

The exercises connected with the conferring of the degrees of Doctor of Pharmacy, Pharmaceutical Chemist and Master in Pharmacy were held in the Academy of Music, Wednesday evening, April 15th. The degrees were conferred by the President, Howard B. French. The following received the degree of Doctor of Pharmacy (P.D.):

Name.	*Subject of Thesis.*	*State.*
Albert, Howard,	A Critical Examination of the Quality of Crude Vegetable Drugs,	Pennsylvania.
Allen, Robert Wallin,	Drugs Indigenous to China,	Pennsylvania.
Ames, Arthur Garfield,	Amanita Muscaria,	New Jersey.
Anthony, Herbert Spencer,	Antitoxin,	Pennsylvania.
Ashmead, Virden Peter,	The Disadvantage of Petroleum Products as Basis of Ointments,	Pennsylvania.
Baas, Charles Wesley,	Atropine,	Pennsylvania.
Billetdoux, Chester A.,	Precipitation in Prescriptions,	New York.
Burkholder, Lloyd A.,	Epigæa Repens,	Pennsylvania.
Chambers, Frank Joseph,	Cannabis Indica,	New Jersey.
Coleman, William Fogg,	Liquor Ammonii Acetatis,	Pennsylvania.
Cooper, Clyde Heaton,	Eucalyptus,	Pennsylvania.
Cossaboom, Herbert S.,	Calcium,	New Jersey.
Crossley, Samuel Wallace,	Cinchona,	Pennsylvania.
Currinder, Alva Batten,	The Garbling of Commercial Vegetable Drugs,	Delaware.
D'Alemberte, Herbert H.,	Phytolacca Decandra,	Florida.
Daub, Charles Melvin,	Opium,	Pennsylvania.
Davis, Howard Sherman,	The History of Paregoric,	Pennsylvania.
Dilks, John,	Adrenalin,	New Jersey.
Ebert, James Monroe,	Belladonna,	Pennsylvania.
Edwards, Lawrence,	Volatile Oils,	Pennsylvania.
Eichold, Bernard Herbert,	Ipecacuanha,	Alabama.
Fox, Morris Wayne,	The Purification of Argols,	Pennsylvania.
Fralinger, John Joseph,	Liquor Magnesii Citratis,	Pennsylvania.
Galbraith, William H., Jr.,	Bismuthi Subnitras	Pennsylvania.
Garvey, Joseph Peter,	Salol,	Pennsylvania.
Gerson, Dora Goldie,	Cinchona,	Pennsylvania.
Groff, William,	Official Digestive Ferments,	Pennsylvania.
Guier, Luis Javier,	Tobacco,	Costa Rica, C. A.
Guthrie, Ira Culpepper,	Spiritus Ætheris Nitrosi,	Texas.
Harbaugh, Duncan James,	Mentha Piperita,	Pennsylvania.
Harbold, John Tilden,	Bacteria and Prevention of Bacterial Growths in Syrups,	Pennsylvania.
Harmening, Frederick H.,	The Advantages of a Fat-free Tincture of Digitalis,	Ohio.
Headings, Prestie M., P.C.,	Glycerin,	Pennsylvania.
Hecker, Andrew Ned,	Coca,	Pennsylvania.

Name.	*Subject of Thesis.*	*State.*
Hemmersbach, Henry W.,	Acidum Boricum,	Pennsylvania.
Hetherington, J. N. C.,	Commercialism in Pharmacy,	Pennsylvania.
Hinski, Oscar Nicholas,	Ficus Carica,	Pennsylvania.
Holcombe, John Heisler,	Gossypium Purificatum,	New Jersey.
Holstein, George Leon,	Syrupus Acidi Hydriodici,	Pennsylvania.
Hoover, Robert Adams,	Foundation of the Metric System,	Pennsylvania.
Johnson, Chauncey N.,	Potassii Bitartras,	Pennsylvania.
Jones, Clarence,	Cascara Sagrada,	Pennsylvania.
Keener, James Blaine,	Fuel and its Metamorphoses,	Pennsylvania.
Keller, Martin Luther,	Spongia,	Pennsylvania.
Kempte, Floyd Budd,	The Relations of the Pharmacist and Physician,	New Jersey.
King, Grant Wagner,	Cocaine Hydrochlorate,	Indiana.
Leaman, John B.,	Digitalis,	Pennsylvania.
Lee, Robert Edward,	The Successful Pharmacist,	Pennsylvania.
Light, Charles Augustus,	Encapsulating,	Pennsylvania.
Loyer, Marcus Brownson,	Suggestions about a Drug Store,	Pennsylvania.
Mader, James Wilson,	Ceratum Resinæ Compositum,	Pennsylvania.
Malloy, Westley General,	Gossypium Purificatum,	Pennsylvania.
Markle, Howard Overholt,	Acidum Tannicum,	Pennsylvania.
Mayers, James Curtis,	Liquor Ferri et Ammonii Acetatis,	Maryland.
Michael, Horace,	Compressed Tablets,	Pennsylvania.
Morgan, Harold Bertram,	Compressed Tablets,	Pennsylvania.
Moyer, Lewis Nathan,	Glyceritum Vitelli U. S. P.,	Pennsylvania.
Musson, Katharine J.,	Incompatibilities of Strontium Bromide,	Pennsylvania.
Reburn, Albert Randolph,	Suprarenal Glands, and their Active Principle, Adrenalin,	Pennsylvania.
Reed, James Garfield,	Oil of Sunflower Seed,	Ohio.
Roth, Emil Krieger,	Digitalis, its Action and Derivatives,	Pennsylvania.
Rothwell, Eugene,	Rhamnus Purshiana,	Pennsylvania.
Schmidt, Otto Waldemar,	Unguenta,	Ohio.
Scott, Stanhope McClellan,	Uric Acid,	W. Virginia.
Seeley, Chester Belting,	Podophyllum Peltatum,	New Jersey.
Shiffer, Daisy Rhodes,	Syrupus Tolutanus,	Pennsylvania
Shillito, Charles Emmert,	Preparations of the Hypophosphites,	Pennsylvania.
Shrenk, Murray Hamilton,	The History of Sponges,	Pennsylvania.
Smith, Clarence Daniel,	Conium Maculatum,	Pennsylvania.
Smith, Henry Addison,	Beet Sugar: its History and Manufacture,	New York.
Smith, Jacob Schall,	Sulphur Præcipitatum,	Pennsylvania.
Smith, William Henry,	Effervescent Magnesium Sulphate,	Virginia.
Snyder, David Stahl,	Business Methods in Pharmacy,	Pennsylvania.
Stallsmith, Walter Edgar,	The Distillation of Oil of Wintergreen and Oil of Birch,	Pennsylvania.
Stimmel, Irvin Siegfried,	Heroin,	Pennsylvania.
Stine, William Earl,	Cedron,	Pennsylvania.
Stolz, David,	The Salt Industry at Syracuse, N.Y.,	New York.

Name.	*Subject of Thesis.*	*State.*
Stuck, Willard Steans,	Digestive Ferments,	Pennsylvania.
Sutliff, Jacob,	Ginseng,	Pennsylvania.
Tripmaker, Walter Wm.,	Senna,	Pennsylvania.
Tuohy, James Louis,	Belladonna *versus* Scopola,	New Jersey.
Van Dyke, James Packer,	Taraxacum,	Pennsylvania.
Walmsley, Charles Edw.,	The Evolutions of Kaolins,	New Jersey.
Welsh, Ralph Liguori,	Gossypium,	Pennsylvania.
Wolford, James Walter,	Liquor Sodæ Chloratæ,	Texas.
Wollaston, Byron Parker,	Eucalyptus,	Pennsylvania.
Woodside, John M.,	Hydrogenii Dioxidum,	Pennsylvania.
Zimmerman, Charles S.,	Saw Palmetto,	Pennsylvania.

The following received the degree of Pharmaceutical Chemist (P.C.):

Name.	*Subject of Thesis.*	*State.*
Boyd, Guy Stephen,	Truss Fitting,	Pennsylvania.
Kisner, George W.,	Opium,	New Jersey.

The "Certificate of Proficiency in Chemistry" was awarded to Harry M. Capwell and John Austin Roberts.

The degree of Master of Pharmacy, *honoris causa*, was conferred upon the following: George Mahlon Beringer, James Michener Good, Wallace Procter and Henry Solomon Wellcome.

The degree of Master in Pharmacy in course was conferred upon Martin Inventius Wilbert, the subject of his thesis being "Commercial Aloes" (see page 201).

ANNOUNCEMENT BY THE DEAN. Prof. Joseph P. Remington announced that the President's cup, offered by Howard B. French in 1901, for high class average, had been won by the present class. The following received the grade of distinguished: Howard Albert, Chester Augustus Billetdoux and Chauncey Nicholas Johnson.

THE VALEDICTORY ADDRESS was delivered by Hon. G. Harry Davis, in which he pointed out that the study of science for the sake of science alone was the height of selfishness; but if it were studied with the ultimate aim of benefiting humanity, then the aim was a most worthy one. He pointed out that a man might attain success in whatever field he chose if he worked to that end. In conclusion he portrayed the true man, and said that to attain this should be the supreme effort of each one.

AWARD OF PRIZES.

THE WILLIAM B. WEBB MEMORIAL PRIZE of a gold medal and certificate, offered by Mrs. Rebecca T. Webb for the highest general average in the examination of the committee, operative pharmacy and specimens, was awarded to Chauncey Nicholas Johnson and presented by William J. Jenks. The following graduates received honorable mention in connection therewith: Howard Albert, Chester A. Billetdoux, Westley G. Malloy, Lewis N. Moyer and Clarence Daniel Smith.

THE PHARMACY PRIZE, a gold medal, offered by Professor Remington for original pharmaceutical work, was awarded to Harold Bertram Morgan, John J. Fralinger receiving honorable mention in connection therewith.

THE CHEMISTRY PRIZE of $25, offered by Prof. Samuel P. Sadtler for original work in quantitative analysis, was awarded to Chauncey Nicholas Johnson, the following graduates receiving honorable mention in connection therewith: Bernard H. Eichold and David Stolz.

THE PHARMACOGNOSY PRIZE of $25, offered by Prof. Henry Kraemer for original work in botany and pharmacognosy, was awarded to John Tilden Harbold, the following graduates receiving honorable mention: Howard Albert, Bernard H. Eichold and Jacob Sutliff.

THE MATERIA MEDICA PRIZE of $25, offered by Prof. Clement B. Lowe for best examination in materia medica, the recognition of specimens and a meritorious thesis, was awarded to Westley G. Malloy. The following graduates received honorable mention in connection therewith: Chester A. Billetdoux, Morris W. Fox, James C. Mayers and Lewis N. Moyer.

THE ANALYTICAL CHEMISTRY PRIZE of $25, offered by Prof. Frank X. Moerk for the best examination in quantitative and qualitative analysis by students receiving the grade of "very satisfactory" in both the second and third years, and passing a competitive examination, was awarded to Chauncey Nicholas Johnson and presented by George M. Beringer. Howard Albert received honorable mention in connection therewith.

THE MAISCH PRIZE of $20, offered by Mr. J. H. Redsecker, of Lebanon, for histological knowledge of drugs, was awarded to Lewis Nathan Moyer and presented by Joseph W. England. The following students received honorable mention in connection therewith: James N. C. Hetherington, Robert A. Hoover, Westley G. Malloy, Otto W. Schmidt and Ralph L. Welsh.

THE OPERATIVE PHARMACY PRIZE of $20, offered by Prof. Joseph P. Remington for the best examination in operative pharmacy, was awarded to Irvin Siegfried Stimmel and presented by James T. Shinn. The following graduates received honorable mention in connection therewith: Howard Albert, Chauncey N. Johnson, Horace Michael, Clarence Jones, Harold B. Morgan, Westley G. Malloy, Otto W. Schmidt, Clarence D. Smith, Byron P. Wollaston, Chas. S. Zimmerman.

THE THEORETICAL PHARMACY PRIZE, consisting of a fine Troemner prescription balance, offered by Mr. M. N. Kline for the best examination in theory and practice of pharmacy, was awarded to Chester Augustus Billetdoux, the following graduates receiving honorable mention in connection therewith: Howard Albert, Eugene Rothwell, Otto W. Schmidt, Guy S. Boyd, Chas. E. Shillito, David S. Snyder, Luis J. Guier, John M. Woodside, Katharine J. Musson.

THE COMMERCIAL TRAINING PRIZE of $20, offered by Prof. Joseph P. Remington to the student passing the best examination in this branch, was awarded to Bernard Herbert Eichold and presented by Dr. A. W. Miller. The following graduates received honorable mention in connection therewith: Howard Albert, Chester A. Billetdoux, Wm. F. Coleman, Morris W. Fox, John T. Harbold, Martin L. Keller, Robert E. Lee, Eugene Rothwell, Katharine J. Musson, Charles E. Shillito and Clarence Daniel Smith.

THE INSTRUCTORS' PRIZE of $20, offered by the instructors for the highest term average in the branches of pharmacy, chemistry and materia medica, was awarded to Chester Augustus Billetdoux and presented by Freeman P. Stroup.

The following graduates received honorable mention in connection therewith: Morris W. Fox, Chauncey N. Johnson and Jacob S. Smith.

THE PHARMACY QUIZ PRIZE, one year's membership in the American Pharmaceutical Association, offered by C. H. LaWall for the best term work in theory and practice of pharmacy, was awarded to Chester Augustus Billetdoux. The following graduates received honorable mention in connection therewith: Herbert H. D'Alemberte, Morris W. Fox, John H. Holcombe, Chauncey N. Johnson, James W. Mader, Westley G. Malloy, Clarence D. Smith, Jacob S. Smith.

COMPLIMENTARY SUPPER OF THE FACULTY.

A complimentary supper was given to the graduating class by the members of the Faculty, on Tuesday evening, April 14th, in the Museum of the College. Some of the officers and trustees of the College were present, as also other invited guests. The grade of scholarship attained by the Class of 1903 being higher than that of the preceding class, they were entitled to receive the President's cup. It was presented by Mahlon N. Kline on behalf of the donor, Howard B. French, and received on behalf of the class by Lewis N. Moyer. This was also the occasion for the unveiling of the Walter Sellers Memorial Tablet, which was presented to the College on behalf of the Alumni Association by Joseph W. England, and received by the President, Howard B. French. The latter also received for the College the resolutions of the class on the death of W. Nelson Stem, which were presented by the president of the class.

Professor Remington acted as toastmaster, and toasts were responded to by the members of the Faculty and Instructors, some of the members of the College and Board of Trustees and by many of the members of the graduating class.

BACCALAUREATE SERMON.

The baccalaureate services were held in Christ Church, Second Street above Market Street, on Sunday, April 12th, the sermon being delivered by the rector, Rev. C. Ellis Stevens, LL.D., D.C.L.

THE ALUMNI ASSOCIATION.

The thirty-ninth annual meeting of the Alumni Association was held in Alumni Hall on Monday afternoon, April 13th, at 2.30 o'clock, with the President, William G. Nebig, in the chair.

Following the annual address of the President, reports from the officers and standing committees were read. The following officers were elected for the ensuing year: President, Albert Oetinger; Vice-Presidents, Jacob M. Baer and Walter A. Rumsey; Treasurer, C. Carroll Meyer; Recording Secretary, Wm. E. Krewson; Corresponding Secretary, Freeman P. Stroup; Board of Directors: Melvin W. Bamford, J. W. Frey, George B. Weidemann, Henry C. Blair and Clarence H. Campbell.

The thirty-ninth annual reception was held in the evening of the same day in the College Museum, Wm. G. Nebig presiding. After the roll-call by the Secretary, of new members elected during 1902 and 1903, they were addressed by George Bradford Carr, Esq.

The prizes offered by the Association were presented as follows:

THE ALUMNI GOLD MEDAL for the best general average of the Class of 1903 was awarded to Howard Albert, and presented by Albert Oetinger.

THE ALUMNI PRIZE CERTIFICATES, awarded to the members of the class receiving the highest averages in each of the following branches, were presented by Joseph L. Lemberger: In Pharmacy, to Chester A. Billetdoux; in Chemistry, to Guy S. Boyd; in Materia Medica, to Westley G. Malloy; in General Pharmacy, to Harold B. Morgan; in Operative Pharmacy, to Irvin S. Stimmel; in Analytical Chemistry, to Chauncey N. Johnson; in Specimens, to James N. C. Hetherington.

THE ALUMNI SILVER MEDAL, for the best general average in the final examinations of the students of the second year class, was awarded to Miss Millicent S. Renshaw and presented by Jacob M. Baer.

THE ALUMNI BRONZE MEDAL, for the best general average in the final examinations of the students of the first year class, was awarded to Lloyd P. Palmer and presented by Walter A. Rumsey.

The Class Oration was given by John T. Harbold; the Poem by Charles A. Light; the Class History by Duncan J. Harbaugh, and the Prophecy by Herbert S. Anthony.

EXAMINATION QUESTIONS.

The following is a copy of the questions given to the students of the third year class at their recent final examinations. The examinations in Operative Pharmacy and Analytical Chemistry were practical, and were conducted in the respective laboratories; the others were written.

THEORY AND PRACTICE OF PHARMACY.

A—(1) Describe the process for the manufacture of Aloes. (2) What kind of Aloes are now found in commerce? (3) What is the official name of Purified Aloes? (4) Give briefly the official process for purifying Aloes. (5) Give the official names of two liquid preparations and five official pills containing Aloes. (6) What is the active principle of Aloes? (7) What is Histed's Test?

B—Give the unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of Cold Cream, Tully's Powder, Basham's Mixture, Paregoric, Glyconin and Turpeth Mineral.

C—Give the English name, ingredients, brief outline of process and describe the appearance of Syrupus Hypophosphitum, Tinctura Lavandulæ Composita, Spiritus Ammoniæ Aromaticus, Mel Despumatum, Liquor Sodæ Chloratæ and Infusum Sennæ Compositum.

D—Alkaloids.—(1) What is the etymological meaning of the word "alkaloid"? (2) From what sources are alkaloids obtained? (3) What is the object of salifying alkaloids? (4) Name the solvents in which most alkaloids are most soluble. (5) Name the solvents in which most alkaloidal salts are most soluble. (6) In what respects do alkaloids differ from glucosides? (7) How may alkaloids be distinguished by their official Latin names and English names from most other bodies? (8) Name three liquids used to identify alkaloids by chemical tests.

E—Poisons.—(1) Define the word "poison." (2) What precautions are necessary to protect the dispenser who sells poisons from legal responsibility? (3) What, in your opinion, is the best method to be used in the pharmacy for preventing the possibility of a mistake through accidentally dispensing the wrong medicine? (4) Describe any other methods for effecting the same object, mentioning their advantages and disadvantages.

F—Pills.—(1) Name three physical requisites for a properly made pill mass. (2) Describe briefly the process for sugar-coating pills. (3) Describe briefly the process for gelatin-coating pills. (4) What is the objection to manufacturing gelatin-coated pills having the needle-holes exposed?

G—Tablets and Tablet Triturates.—(1) Describe briefly the principle upon which tablet machines depend for their action. (2) What methods are in use for preparing a powder which is not easily compressed, so that it can be readily used in a tablet machine? (3) What are the objections to dispensing a tablet which is either too hard or too soft? (4) Describe the method for making tablet triturates.

H—(1) What is the object of pharmaceutical legislation? (2) What should be the qualifications of a Board of Pharmacy? (3) Why is there not a United States Pharmacy Law? (4) Give the reasons for advocating the payment of all expenses of enforcing pharmacy laws by the State? (5) Why should all receipts be turned into the State treasury and all expenses be paid by the State? (6) Why should every registered pharmacist be compelled to have a diploma from a recognized college before taking his examination?

J—Criticise and translate the following prescriptions. Write out, with English names, the ingredients and quantities. State how you would compound them, or what course you would pursue. Give the meaning of names and marks on the margins:

3592

℞ Potas. Brom. ℥ss
Tr. Cannab. f℥v
Vin. Ergota f℥ss
Spt. Amm. Ar. f℥ij
Aquæ ad. f℥viij

Sig.—A tablespoonful.

✓ × Dec. 6, '83 B. J. R.

℞ Argent. Oxid. gr. xvi
Strychnia gr. i
60587 Pulv. Capsici gr. xxiv
SC Ext. Gentiana ℈ij
M. ft. pill No. = xxxii

Sig.—On box the contents of each pill.
One after each meal. D.

27639. 2/8, '03.

℞ Tr. Ferri Chlor. ℥ij ♏xl
Acid. Phosp. dil. ℥j ♏xl
✓ × Spt. Limonis ℥ij
Syrup. et Aquæ q. s. ℥iv

Sig.—2 teaspoonfuls 4 times daily.

K—Fill up three of the labels upon the sheet attached, writing suitable directions for the prescriptions found on Question J.

Then write three prescriptions upon the blanks printed on the label sheet for the following, numbering and dating each: (1) Twelve powders for a

child six years old, suffering from mild indigestion and diarrhœa caused by eating unripe fruit. (2) One for an old lady requiring a tonic, containing Quinine, Iron Phosphate and Elixir of Orange (teaspoonful dose, 8-ounce mixture). (3) One metric prescription for a man thirty years old, requiring a suppository containing Extract of Stramonium, Goulard's Extract and Creosote (twelve suppositories).

Write labels for the prescriptions above, and also for the following: Upon labels for Nos. 4, 5, 6, 7 and 8 (see below), write brief directions for use, for the pills, ointment, drops, tablet triturates and emulsion.

(4) One for a simple ointment, ½-ounce, to apply for a slight eruption on the face, due to sunburn. (5) One for drops for inflamed eyes, 1 fluid-ounce solution. (7) One for twelve tablet triturates, in screw-cap vial, for headache due to over-study. (8) One for a pint bottle containing Cod-Liver Oil. (9) Fill in the address tag for one of the patients, using any name or address. (10) Fill in the check-blanks in lower left-hand corner, for one of the patients.

CHEMISTRY.

A—(1) State the chemical distinction between an aldehyd and a ketone, and illustrate by an example showing the derivation of each. (2) What are the distinguishing reactions of each class? (3) Mention important pharmaceutical compounds that belong to each of these classes. (4) Mention important pharmaceutical compounds that are formed as the result of reactions in which one or the other of these classes is concerned.

B—(1) State the natural sources of Tartaric Acid and Citric Acid respectively, and how they are prepared from these sources. (2) Give tests, both physical and chemical, by which these acids can be distinguished from each other. (3) Give the chemical formulas and names of the official tartrates and of the official citrates.

C—(1) What is an enzyme? Give examples of enzymes important for pharmaceutical processes. (2) What are the conditions needed for the activity of enzymes, and under what conditions is their activity arrested? (3) State the important classes of organic ferments. (4) Write the reactions for the alcoholic, lactic, butyric and acetic fermentations respectively. (5) State the conditions under which each of these fermentations takes place most readily.

D—(1) State the distinction between a phenol, a phenolate, a phenol-ester, a phenol-sulphonate and a phenol-acid, and give illustrations belonging to each class. (2) Write the structural formulas of the several diatomic phenols and name them. (3) How can common phenol be made synthetically, and from what sources? (4) What are the pharmacopœial tests for common phenol?

E—(1) Describe Salicylic Acid, and give the official tests for the same. (2) How is Salicylic Acid made synthetically? Write the reaction. (3) Write the formulas of the normal and basic sodium salicylates. (4) Give the names and write the formulas of two official esters of Salicylic Acid.

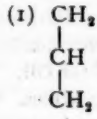
F—(1) What is a terpene, and by what reactions and tests can a terpene be identified? (2) What other constituents occur in essential oils besides terpenes? Illustrate by examples of official oils. (3) Mention important essential oil constituents of the phenol class; of the ester class; of the aldehyd class; of the alcohol class. (4) Mention essential oils or constituents of the same that are used in the manufacture of perfumes and flavoring extracts.

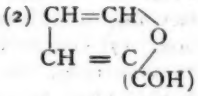
G—(1) What adulterations are to be looked for in Olive Oil, and how are they detected? (2) How is lard adulterated, and by what tests is its purity established? (3) How is butter tested for its purity, and how is oleomargarine indicated? (4) By what tests is the adulteration of milk shown?

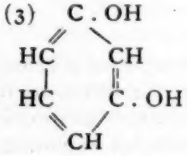
H—Write the structural formulas for:

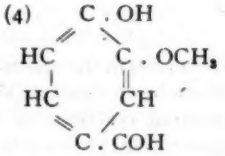
(1) Chloral. (2) Acetone. (3) Sulphonal. (4) Acetanilid. (5) Benzaldehyd. (6) Gallic Acid.

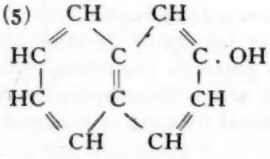
J—Give the proper chemical names, and when official, the official names of the following compounds:

(1) 

(2) 

(3) 

(4) 

(5) 

K—*Question in Proximate Organic Analysis.*—Given a Linseed Oil which has been adulterated with mineral oil and resin, and then thinned with turpentine—state how you would identify the several substances present, and determine the approximate amount of each.

MATERIA MEDICA.

A—*Alkaloids.*—(1) Give the official names, botanical names, natural orders and habitats of the plants yielding the following, viz.: Pelletierine, Daturine, Coniine, Nicotine, Eserine, Emetine, Brucine, Codeine, Hyoscine, Narcotine. (2) Which two of these act as emetics, which as a tænifuge, which two as mydriatics, which two as myotics, which paralyzes the motor nerves?

B—*Castor Oil.*—(1) State its official name, plant from which derived, and method of extraction; name a poisonous principle present in the seed but not in the fixed oil. (2) State the adult dose and three good methods of administration. (3) How can excessive action be guarded against? (4) Why is it frequently administered as a remedy for diarrhœa? (5) Why should it not be given after the administration of Oleoresin of Aspidium, or in the advanced stage of pregnancy?

C—*Drugs Yielded by Pinus Palustris, etc.*—(1) Give official names of a concrete oleoresin, an impure oleoresin, a volatile oil, and a resin obtained directly

or indirectly from this source. (2) State briefly how each is obtained. (3) What is the action of the volatile oil when applied externally or taken internally, in what doses is it given and what preparation of it should be prescribed?

D—N. O. Rubiaceæ.—(1) Give botanical names of the plants belonging to this order that yield two official barks, an official root, and a seed yielding an official alkaloid. (2) State the alkaloidal requirements of the U.S.P. for these barks, their habitat and their present commercial source. (3) Name the four principal alkaloids present in these barks. State the action of the alkaloids upon micro-organisms and upon the white blood corpuscles. What condition do they produce if taken in excessive doses?

E—Eucalyptus.—(1) Give its botanical name, natural order and habitat. (2) How can you distinguish between the leaves of young and those of older parts of the tree? Which kind is official? (3) What amount of volatile oil is present in the leaves, and what is the chief constituent of this oil? What terpene is the chief constituent of the volatile oil derived from some species of Eucalyptus? (4) What are the medicinal properties of the leaves and volatile oil? By what channels is the latter excreted?

F—Glucosides.—(1) Give the botanical names of the plants yielding the following, viz.: Amygdalin, Digitalin, Colocynthin, Marrubiin, Gentiopicrin, Arbutin, Bryonin, Daphnin, Salicin, Convallarin. (2) Which two of these act as heart tonics, which two as drastic purgatives, which two as bitter tonics, which as a diuretic, which as an antiperiodic? What derivatives are produced by the splitting up of Amygdalin and Arbutin?

G—Volatile Oils.—(1) Name two official volatile oils that yield eugenol, two anethol, one menthol, one thymol, one safrol, one cinnamic aldehyde, two methylsalicylate. (2) State the official names of the following volatile oils, viz.: Neroli, Orange Peel, Pennyroyal, Lavender Flowers, Bitter Almond, Cade, American Wormseed, Cassia, Fleabane, Bay.

H—Cathartic Drugs.—(1) State the active constituent of Mandrake Root and amount present. How is the resin obtained and what is its dose? (2) What action does it have upon the liver, and upon what part of the intestinal tract does it principally act? What other cathartic acting upon the lower bowels is usually associated with it? (3) State the dose of Gamboge, Croton Oil, Jalap, Scammony and Flaterin.

J—Toxicology.—State briefly the symptoms and treatment of cases of poisoning by each of the following drugs, viz.: Opium, Strychnine, Arsenic, Carbolic Acid.

K—Emergency Case.—(1) Give a brief outline of the manner in which you would treat, antiseptically, an incised wound of the forearm. (2) Also a scalp wound. (3) A boy whose leg was badly injured was saved from bleeding to death by the prompt action of a druggist; how would you act under similar circumstances?

COMMITTEE.

A—Mercury.—(1) Give unabbreviated official name, specific gravity, symbol. (2) From what locality in the United States is it largely obtained? (3) In what combination does Mercury usually exist in nature? (4) What process is used in separating it from this combination? (5) What two series of salts are formed by Mercury? (6) To which series does Corrosive Sublimate belong? (7) Write the chemical formula and state the dose of Corrosive Sublimate.

(8) Give the official and common names of "Hydrargyri Submurias." (9) Give a test for the presence of Corrosive Sublimate in Calomel. (10) Name five preparations of Mercury.

B—Preservation of Drugs.—(1) State the best manner of keeping each of the following drugs, and the reasons governing each case, viz.: Ergot, Cantharides, Powdered Squill, Cod Liver Oil, Quinine Sulphate, Sodium Sulphate, Carbolic Acid (crystals), Zinc Chloride, Silver Nitrate, Benzin. (2) *N. O. Umbelliferæ.*—What kind of fruit is characteristic of this order? Name four official fruits and four official volatile oils derived from these fruits. Name an official fruit yielding a volatile alkaloid, and state the characteristic odor of this alkaloid. Name two official gum resins derived from plants of this order. Which of these yields a sulphuretted volatile oil? What is the color test for these gum resins? How can an emulsion be made from them? Give the names of two official emulsions, each containing one of these gum resins.

C—Fixed and Volatile Oils.—(1) Describe briefly three processes for making the fixed oils of commerce used medicinally. (2) Name five official fixed oils, giving English and Latin names. (3) Describe briefly three processes by which volatile oils are procured. (4) Name five official volatile oils, giving English and Latin names.

D—Doses and Antidotes.—Give the maximum single dose of each of the following. Also name the antidotes and physiological antagonists of the first four of them: (1) Tincture of Aconite. (2) Tincture of Digitalis. (3) Cocaine Hydrochlorate. (4) Morphine Sulphate. (5) Strychnine Sulphate. (6) Diluted Hydrocyanic Acid. (7) Codeine Sulphate. (8) Tincture of Nux Vomica. (9) Atropine Sulphate. (10) Hyoscyamine Sulphate.

E—Give the English name or synonym, ingredients, brief outline of process and describe the appearance of Liq. Ferri et Ammonii Acetatis, Pilulæ Rhei Compositæ, Syrupus Ipecacuanhæ, Tinctura Gentianæ Composita, Vinum Antimonii and Spiritus Juniperi Compositus.

F—(1) What different forms of Ethyl Alcohol are official? Give the names of each. (2) Give a brief outline of the manufacture of Alcohol. (3) Give the specific gravities and percentage of Alcohol and water in official Alcohols. (4) How is the percentage obtained, and what effect has the temperature on the result? (5) What takes place when Alcohol and water are mixed together? (6) How is the presence of Methyl Alcohol in Alcohol detected?

G—By what tests can you distinguish between: (*a*) Resorcin and Pyrogallol? (*b*) Methyl Alcohol and Ethyl Alcohol? (*c*) Quinine Sulphate and Morphine Sulphate? (*d*) Acetanilid and Phenacetin? (*e*) How can you detect Acetanilid as an adulterant of Phenacetin?

H—Oleoresins.—(1) What is an Oleoresin? (2) How are Oleoresins prepared? (3) What precautions are necessary in recovering the menstruum used in their preparation? (4) What liquids have been proposed as substitutes for the official menstruum? (5) Give the official and English names and doses of five Oleoresins. (6) Which of the official Oleoresins deposit the active constituent on standing? (7) Which of the Oleoresins deposit inert constituents on standing?

J—Criticise the following prescriptions. State whether you would dispense each as written, and what precautions are necessary in compounding or dispensing:

No. 1.

℞ Salol ℥j
Beta Naphthol ℥ss
Camphor Monobrom. gr. xx
Thymol gr. xl
Mx. ft. Chart. No. xii.
Sig.—Use as directed. T. S. W.

No. 2.

℞ Creosoti f℥i
Spt. Frumenti
Glycerini āā f℥iiss
Sig.—A dessertspoonful 3 times a day. U. T.

No. 3.

℞ Tinct. Opii f℥j

K—Criticise the following prescriptions; state whether you would dispense each as written, and what precautions are necessary in compounding or dispensing:

No. 4.

℞ Terpini Hydras
Heroinæ Hydrochlor. āā gr. xxiv
Ammon. Chlor. ℥j
Mx. ft. Tab. Comp. No. xxiv.
Sig.—Two at night. V. X.

No. 5.

℞ Bals. Copaibæ f℥j
Ol. Cubebæ f℥ij
Spt. Æth. Nit. f℥iss
Acaciæ q. s.
Aquæ Cinnam. q. s. ft. f℥vj
Mx. ft. Emulsio.
Sig.—A dessertspoonful 4 times a day. M. M.

No. 6.

℞ Ol. Erigerontis gtt. xx
Ext. Ergotæ
Ext. Viburnii āā gr. xxiv
Mx. ft. Capsulæ No. xii.
Sig.—One 3 times a day. S. K.

OPERATIVE PHARMACY.

(1) PILLS.

Ferrous Sulphate	4	Grammes
Potassium Carbonate	2	"
Sugar Powd.	1	Gramme
Tragacanth Powd.	·25	"
Althæa Powd.	·25	"
Glycerin		
Water, of each	2	Drops

Make twenty-five pills; coat twelve of them with silver leaf; put the coated and uncoated pills in separate boxes, labelling each box.

N. B.—The silver leaf will be found in the pill-box.

(2) PRESCRIPTION.

℞ Salolis . . . . . ℥j
Creosoti . . . . . gtt. xxx
Olei Amygdal. Exp. . . . . fld. ℥ij
Acacia, q. s.
Aq. Cinnam. ad. . . . . fld. ℥iv
M. ft. mist. secundum artem.

(3) ALCOHOLMETRIC TEST.

Estimate the amount of alcohol in the sample of White Wine; put all calculations on the sheet of paper, with your name, examination number, and the letter of the sample estimated.

(4) PLASTER.

Spread a breast plaster about 6 inches in diameter. Soap plaster will be found in the dipper. Write your name and examination number on the margin.

(5) Fill six soluble elastic capsules with Cod Liver Oil, seal them with gelatin and put them in the box.

COMMERCIAL TRAINING.

A—Obtaining Positions.—(1) State briefly the method that you would consider most effective in obtaining a position with either a retail druggist, a wholesale house or a manufacturing firm, selecting one of them. (2) Write a business letter, using the name of any retail druggist, wholesale house, or manufacturing firm that you choose in making application for a position. Fold the letter properly and place it in an envelope suitably addressed.

B—Going into Business.—Describe briefly under the following heads how you would enter the drug business as a proprietor. (1) Buying out an old stand. (2) Selecting a new location. (3) Arranging the terms. (4) Providing for the payment. (5) Establishing credit.

C—Mercantile Agencies.—(1) What is the object of a mercantile agency? (2) How do they obtain their information? (3) Is it best to furnish correct information about your business standing? Why?

D—Selecting the Business Houses from Which to Purchase Your Goods.—(1) State briefly the class of business houses that you would select in buying your stock, giving reasons. (2) Write out an order, upon the letterhead furnished, to a wholesale drug-house, being careful to use proper forms, abbreviations and details, for ten articles that you would be apt to need, each representing a different class of goods; say one chemical, one drug, one fluid extract, etc. Write the order in such form that the drug-house would not be in doubt on a single point, fold it properly and place it in an envelope correctly addressed.

E—Insurance.—(1) Define insurance. (2) Of what value is insurance in business? (3) How does life insurance benefit a business man's standing? (4)

What is the meaning of the insurance terms, policy, premium, good risk, endowment policy, life policy and joint-life policy?

F—Banks.—(1) What is the object of a bank? (2) How is an account opened with a bank? (3) Why does a teller require a person drawing money to be identified? (4) Why is a bank check usually drawn "to order"? (5) What means are employed by the drawer of a check to make forgery difficult? (6) How is the "raising" of a check made difficult? (7) Why is it necessary to endorse a check payable to order exactly as the name is spelled upon its face? (8) What is meant by a certified check? (9) Having $608.10 on deposit, draw a check upon the "Pharmacist's Bank" for $112.64, omitting no necessary detail.

G—Commercial Terms.—Define the following terms: (1) Promissory note. (2) Draft. (3) P. O. Money Order. (4) Will. (5) Executor. (6) Administrator. (7) Heir. (8) Deed. (9) Title Insurance. (10) Mortgage. (11) Lease. (12) Indenture.

H—Law Points in Business.—(1) What is the meaning of "Caveat Emptor"? (2) What are Statutes of Limitation? (3) What risk is incurred in endorsing promissory notes? (4) What is the effect of an endorser writing under his signature the words "without recourse"? (5) Why should bank checks be presented promptly for payment? (6) What is meant by "Contributory Negligence"? (7) When is commercial paper falling due on Sunday or any other legal holiday payable?

J—Bookkeeping.—(1) Describe briefly the differences between Double and Single Entry Bookkeeping, mentioning the books used in each. (2) How can you decide, in journalizing, if an entry is to be made on the debit or the credit side of an account? (3) What is meant by the term "trial balance"? (4) Can the trial balance be relied upon for proving the correctness of entries in a set of books? Give a reason for your answer.

K—Bookkeeping.—The entries for the first day in a business just started are as follows. Enter each item in the proper book, posting all items in the ledger:

March 1, 1903.

(Student) commenced business with a cash capital of $7,000.

Bought a drug store from J. C. Badger, situated at Fifty-second and Market Streets, for the sum of $8,000 (estimated stock, $6,300; fixtures, $1,500), on the following terms: Cash, $4,000; note payable to J. C. Badger in two years for $1,500, and a second note payable to J. C. Badger in four years for $2,500.

March 1st.

Bought of Parke, Davis & Co., supplies as per invoice, $273.40. Sold Mrs. C. S. McEntire, ℞ 56720, 75 cents; ℞ 56721, 40 cents; oxygen cylinder and inhaler, $8.75. Sold Mr. William Morrison, sponge, $2.50; air cushion, $3.00. Paid for soda-water supplies, $13.5c. Paid a premium of $35 for one year's fire insurance of $6,000 in the Pennsylvania Fire Insurance Company.

Cash retail sales for the day, $67.14.

QUANTITATIVE ANALYSIS.

(1) Briefly describe the analysis of the alloy brass, stating the conditions of precipitation of the several constituents and the composition of the same when weighed.

(2) In the course of an analysis 0·232 Aluminum Oxide was obtained; how much Alumen U.S.P. does this represent?

(3) *5 c.c.* Spirit of Ethyl Nitrite (sp. gr. 0·839) yields 37 c.c. of Nitrogen Dioxide at 25° C.; what is the percentage strength?

(4) (*a*) How much Sodium Chloride will react with 10 c.c. (tenth normal) Silver Nitrate V.S.? (*b*) How much Hydrogen Dioxide will react with 10 c.c. (tenth normal) Potassium Permanganate V.S.? (*c*) How much Sodium Thiosulphate will react with 10 c.c. (tenth normal) Potassium Dichromate V.S.? (*d*) How much Sulphuric Acid will react with 10 c.c. (half normal) Sodium Carbonate V.S.? (*e*) How much Sodium Bisulphite will react with 10 c.c. (tenth normal) Iodine V.S.?

(5, 6, 7) How would you estimate volumetrically Hydrochloric Acid, Ferrous Iodide, Ammonium Chloride? Start in each case with the standardization of the volumetric solution.

(8, 9, 10) Practical determinations of 5, 6 and 7 in the laboratory.

ANNUAL MEETING.

The annual meeting of the Philadelphia College of Pharmacy was held on March 30, 1903, at the College Building, 145 North Tenth Street.

Thirty-two members were present, the President, Howard B. French, presiding. The minutes of the quarterly meeting held December 29, 1902, were read and approved. The minutes of the meetings of the Board of Trustees for January 6 and February 3, 1903, were read by the acting Registrar, Chas. H. LaWall, and approved.

The annual meeting being the occasion for the reports of the officers and standing committees, these were given in the following order:

President's Report.—"All necessary repairs have been made to the property. The debt of the College has been reduced, as have also the interest charges. For the term 1902–'03, there is an increase in the number of students over the preceding year."

After referring to the course in commercial training the President said:

"This course is of inestimable value to the students and should be continued, and if possible, enlarged.

"During the term the College Class has lost three students by death—two second-year students and one third-year student.

"Eight members have been added to the membership. No resignations have been offered. There have been three deaths.

"In September last, the Semi-Centennial Anniversary of the founding of the American Pharmaceutical Association was held in the College Hall with most interesting exercises appropriate to the occasion. The suggestion in a previous report in reference to establishing a post-graduate course is a matter that should be kept constantly in mind by the Committee on Instruction, that as soon as means will allow and proper facilities can be obtained such a course should be established.

"During the last year your President had occasion to make some investigation into the early history of the College and its membership, and was much surprised to find that the historical records were comparatively meagre and went but little into detail. Your President would, therefore, suggest that a

committee of five be appointed, whose duty it shall be to communicate with the various members of the College, particularly the older members, with the view of securing from them such information as in their judgment would be interesting and desirable for record in the archives of the College. These records should not only embrace matters pertaining to pharmacy, but to the growth and development of the allied professions, of individual effort, whether confined to pharmacy, chemistry, pharmaceutical chemistry, or the wholesale drug line.

"Your President desires to refer with profound sorrow to the loss which your institution has sustained in the sudden death of your late able and efficient Registrar, W. Nelson Stem. His death is not only a great loss to your institution, but is felt as a personal sorrow by the officers, faculty and members of the College.

"In closing, the President desires to express his appreciation of the hearty coöperation extended him by all those actively interested in the work of the College."

Committee on Publication, by Prof. Samuel P. Sadtler.—THE AMERICAN JOURNAL OF PHARMACY has been issued regularly during the year. All bills for the year have been paid. The receipts for the past year have been considerably more than last year, while the expenses have been less. The number of unsold volumes on hand is estimated at about 1,775, covering the period from 1829 to the present time.

Editor's Report, by Prof. Henry Kraemer.—The editor referred to some of the features which had characterized this JOURNAL during the past year.

Report of the Committee on Pharmaceutical Meetings, by Prof. Henry Kraemer.—The meetings have been held regularly during the College year. The programs have been of both professional and practical interest, and the discussions have added much to the profitableness of the meetings. The minutes have been published regularly in the next succeeding issue of the JOURNAL. "During nearly the sixty years that these meetings have been held, their success has depended upon the untiring energy of a few zealous workers. Happily for the College and for the committee, men of ability and opportunity are still to be found."

Report of the Librarian, by Thomas S. Wiegand.—There have been added to the library since last report 108 volumes. The card catalogue has been entirely renewed, so as to be much more easily referred to. The library is becoming more and more known as one of value for reference regarding chemical, botanical and pharmaceutic subjects, not only to our own students, but to residents of our city interested in scientific pursuits. There has been expended during the year for new books and binding, $292.67.

Report of the Curator, by Joseph W. England.—The Museum is in good condition and has received a number of valuable additions during the year. Of these a number were articles exhibited at the historical exhibit of the Semi-Centennial of the American Pharmaceutical Association, held in Philadelphia last September. During the past College year the Museum has been opened every Monday afternoon from 3 to 5 o'clock for the use of the students. The collection of official drugs and preparations in the students' reading-room is still largely used by the students, and is a valuable aid in making them more proficient in the recognition of specimens.

The consideration of the suggestions contained in the report of the President was then taken up: (1) In relation to establishing a post-graduate course. This was referred to the Board of Trustees for reference to the Committee on Instruction. (2) In relation to matters of historical interest, when, after some discussion, it was moved that the President appoint a committee of five (to be a standing committee) to be called "The Historical Committee." The President subsequently appointed the following-named gentlemen: George M. Beringer, William J. Jenks, Henry Kraemer, Jacob M. Baer and Martin I. Wilbert.

The President appointed the following-named gentlemen as Delegates to the Pennsylvania Pharmaceutical Association for its twenty-sixth annual meeting, to be held at Eaglesmere, Pa., June 22, 23, 24, 1903: Henry L. Stiles, William L. Cliffe, Jacob M. Baer, Joseph W. England, C. A. Weidemann, M.D.

The annual election being next in order, the report of the Committee on Nominations was read. Messrs. M. W. Bamford and William G. Nebig were appointed tellers, who, after a ballot was had, reported the election of Howard B. French, President; William J. Jenks, First Vice-President; Richard V. Mattison, Second Vice-President; James T. Shinn, Treasurer; A. W. Miller, Corresponding Secretary; C. A. Weidemann, Recording Secretary; Joseph W. England, Curator; Thomas S. Wiegand, Librarian; Henry Kraemer, Editor.

Trustees, for three years: Wallace Procter, E. T. Dobbins, W. A. Rumsey. Gustavus Pile was elected a member of the Board for two years.

Publication Committee: Henry N. Rittenhouse, Samuel P. Sadtler, Wallace Procter, Joseph W. England, Joseph P. Remington, Richard V. Mattison and the Editor.

Committee on Pharmaceutical Meetings: William L. Cliffe, Joseph P. Remington, C. B. Lowe, Richard V. Mattison and the Editor.

Announcement was made of the death of W. Nelson Stem, late Registrar, which occurred on March 14, 1903. Mr. Stem became a member of the College in 1889. Also of Ernest Biltz, of Erfurt, Germany, a corresponding member.

The President announced that the baccalaureate sermon would be delivered before the Graduating Class by the Rev. C. Ellis Stevens, at Christ Church, on Sunday afternoon, April 12th; also that Judge G. Harry Davis would be the orator at the Commencement, to be held in the Academy of Music on April 15th.

C. A. WEIDEMANN, M.D.,
Secretary.